

# GL: 3-D Graphics

Version 8.17.0.1

Scott Owens

April 13, 2025

The `sgl` libraries provide access to the rendering functions of OpenGL 1.5 and GLU 1.3 libraries. The `sgl` libraries do not address system-level concerns, such as the attachment of GL rendering contexts to displays. Instead, the libraries should work with any Racket extension that provides GL with access to the system (such as a binding for `glx`). Notably, the `racket/gui/base` library provides support for rendering contexts via the `canvas%` class and its `with-gl-context` method.

## **Contents**

|          |                            |           |
|----------|----------------------------|-----------|
| <b>1</b> | <b>Using OpenGL</b>        | <b>3</b>  |
| <b>2</b> | <b>C-Style OpenGL</b>      | <b>4</b>  |
| <b>3</b> | <b>Racket-Style OpenGL</b> | <b>40</b> |
| <b>4</b> | <b>OpenGL Vectors</b>      | <b>45</b> |
| <b>5</b> | <b>Bitmaps</b>             | <b>51</b> |
| <b>6</b> | <b>Initialization</b>      | <b>52</b> |
|          | <b>Index</b>               | <b>53</b> |
|          | <b>Index</b>               | <b>53</b> |

# 1 Using OpenGL

The `sgl/gl` library provides direct access to the C-style OpenGL API, whereas the `sgl` library provides a more Racket-like interface. The `sgl/gl` library provides a binding for each `#defined` constant and for most functions in OpenGL 1.5 and GLU 1.3. The functions perform comparable checking to their C-language counterparts; they check the types of their arguments, but do not check the length of array arguments. The `sgl` library provides wrappers around many of the functions in the `sgl/gl` library to present a more Racket-friendly interface, including function names that follow Racket conventions, and checked, symbolic enumeration arguments, and array-length checks.

**Warning on Safety:** OpenGL programming is inherently unsafe, even when using only the `sgl` library. Although `sgl` checks the arguments to each function call, violation of higher-level assumptions of the system's OpenGL library can cause it to crash, bringing the entire Racket system down. For example, sending a large number of vertices in a single `glBegin` causes at least some GL implementations to crash.

Some examples are available in the "examples" directory of the "sgl" collection in the Racket installation. For "alpha.rkt", try choosing the "sk.jpg" image distributed with Racket in the "icons" collection; you may have to press the `t` key a few times if the spinning cube is blank.

## 2 C-Style OpenGL

```
(require sgl/gl)      package: sgl
```

The `sgl/gl` module provides a direct interface to the system's GL library closely following the conventions of the C-language OpenGL API. It provides a binding for each `#defined` constant (these start with `GL_`) and for the functions in the GL 1.5 and GLU 1.3 specifications, except for the following:

- Vertex arrays (GL 1.5, Section 2.8)
- Buffer objects (GL 1.5, Section 2.9)
- `glGetPointerv` (GL 1.5, Section 6.1.11)
- Buffer object queries (GL 1.5, Section 6.1.13)
- Polygon tessellation (GLU 1.3, Section 5)
- `gluQuadricCallback` (GLU 1.3, Section 6.2)
- NURBS callbacks (GLU 1.3, Section 7.2)

If one of the provided functions is not present on your system (e.g. if your system supports only GL 1.3), then the corresponding `sgl/gl` function raises a run-time exception when invoked.

The functions provided by `sgl/gl` perform comparable checking to their C-language counterparts; they check the types of their arguments, but do not check the length of array arguments. The following details the kinds of Racket values that can be provided for each primitive OpenGL type:

- `GLbyte`, `GLshort`, `GLint`: exact integer in the proper range
- `GLubyte`, `GLushort`, `GLuint`: exact non-negative integer in the proper range
- `GLsizei`, `GLenum`, `GLbitfield`: exact non-negative integer in the proper range
- `GLfloat`, `GLdouble`: real number
- `GLclampf`, `GLclampd`: real number
- `GLboolean`: any value, where `#f` means `GL_FALSE` and all other values mean `GL_TRUE`; do not use `GL_FALSE` or `GL_TRUE`, since they are bound to integers, both will end up being converted to `GL_TRUE`.

OpenGL functions that take vector arguments accept `cvector` values. The type of the `cvector` is checked; for example, `glVertex3fv` expects a vector of `GLfloat`s, so `glVertex3fv` accepts only a `cvector` containing reals. See also `sgl/gl-vectors`. Functions that accept arrays of type `void*` accept any `cvector`; you must ensure that you supply the proper kind of vector, as in the C-language OpenGL API.

Examples:

```
(require sgl/gl
        sgl/gl-vectors)
(glBegin GL_TRIANGLES)
(glVertex3i 1 2 3)
(glVertex4fv (gl-float-vector 1 2 3 4))
(glEnd)
```

```
glPixelMapfv : procedure?
glPixelMapuiv : procedure?
glPixelMapusv : procedure?
glDeleteTextures : procedure?
glDeleteQueries : procedure?
```

These functions do not take a size argument, because it is derived from the length of the argument vector.

```
glGenTextures : procedure?
glGenQueries : procedure?
```

These functions do not take vector arguments. Instead, they allocate a vector of the requested size and return it.

```
glAreTexturesResident : procedure?
```

This function takes in a `GLuint` vector and textures, and it returns 2 values: the specified boolean and a boolean vector of residences.

```
glGetBooleanv : procedure?
glGetIntegerv : procedure?
glGetFloatv : procedure?
glGetDoublev : procedure?
glGetLightfv : procedure?
glGetLightiv : procedure?
glGetMaterialfv : procedure?
glGetMaterialiv : procedure?
glGetTexEnvfv : procedure?
glGetTexEnviv : procedure?
```

```

glGetTexGendv : procedure?
glGetTexGenfv : procedure?
glGetTexGeniv : procedure?
glGetTexParameterfv : procedure?
glGetTexParameteriv : procedure?
glGetTexLevelParameterfv : procedure?
glGetTexLevelParameteriv : procedure?
glGetPixelMapfv : procedure?
glGetPixelMapuiv : procedure?
glGetPixelMapusv : procedure?
glGetMapdv : procedure?
glGetMapfv : procedure?
glGetMapiv : procedure?
glGetBufferParameteriv : procedure?
glGetConvolutionParameterfv : procedure?
glGetConvolutionParameteriv : procedure?
glGetHistogramParameterfv : procedure?
glGetHistogramParameteriv : procedure?
glGetMinmaxParameterfv : procedure?
glGetMinmaxParameteriv : procedure?
glGetQueryiv : procedure?
glGetQueryObjectiv : procedure?
glGetQueryObjectuiv : procedure?

```

Instead of taking a vector argument, these function take an integer argument that specifies the size of the vector that is returned.

```

glGetClipPlane : procedure?

```

This function does not take a vector argument and returns a GLdouble vector of length 4.

```

glGetString : procedure?
gluCheckExtension : procedure?
gluErrorString : procedure?
gluGetString : procedure?

```

These functions deal with strings instead of GLubyte vectors.

```

gluProject : procedure?
gluUnProject : procedure?
gluUnProject4 : procedure?

```

Instead of taking pointers to GLdoubles for return values, these function directly return GLdouble vectors.

```
glSelectBuffer : procedure?  
glFeedbackBuffer : procedure?
```

These functions do not take vectors, instead they return a `selection-buffer-object` or `feedback-buffer-object`. The `select-buffer->gl-uint-vector` and `feedback-buffer->gl-float-vector` functions copy the contents of the buffer into a vector. Because the OpenGL library writes to the buffer-object on OpenGL function calls after `glSelectBuffer` or `glFeedbackBuffer` has returned, if the buffer is garbage collected before OpenGL is finished writing to it, the entire Racket system can crash. The `gl-process-selection` function in `sgl` helps interpret the results of `glSelectBuffer` in a Racket-friendly format.

```
glAccum : procedure?  
glActiveTexture : procedure?  
glAlphaFunc : procedure?  
glBegin : procedure?  
glBeginQuery : procedure?  
glBindTexture : procedure?  
glBitmap : procedure?  
glBlendColor : procedure?  
glBlendEquation : procedure?  
glBlendFunc : procedure?  
glBlendFuncSeparate : procedure?  
glCallList : procedure?  
glCallLists : procedure?  
glClear : procedure?  
glClearAccum : procedure?  
glClearColor : procedure?  
glClearDepth : procedure?  
glClearIndex : procedure?  
glClearStencil : procedure?  
glClipPlane : procedure?  
glColor3b : procedure?  
glColor3bv : procedure?  
glColor3d : procedure?  
glColor3dv : procedure?  
glColor3f : procedure?  
glColor3fv : procedure?  
glColor3i : procedure?  
glColor3iv : procedure?  
glColor3s : procedure?  
glColor3sv : procedure?  
glColor3ub : procedure?  
glColor3ubv : procedure?
```

```
glColor3ui : procedure?
glColor3uiv : procedure?
glColor3us : procedure?
glColor3usv : procedure?
glColor4b : procedure?
glColor4bv : procedure?
glColor4d : procedure?
glColor4dv : procedure?
glColor4f : procedure?
glColor4fv : procedure?
glColor4i : procedure?
glColor4iv : procedure?
glColor4s : procedure?
glColor4sv : procedure?
glColor4ub : procedure?
glColor4ubv : procedure?
glColor4ui : procedure?
glColor4uiv : procedure?
glColor4us : procedure?
glColor4usv : procedure?
glColorMask : procedure?
glColorMaterial : procedure?
glColorSubTable : procedure?
glColorTable : procedure?
glColorTableParameterfv : procedure?
glColorTableParameteriv : procedure?
glCompressedTexImage1D : procedure?
glCompressedTexImage2D : procedure?
glCompressedTexImage3D : procedure?
glCompressedTexSubImage1D : procedure?
glCompressedTexSubImage2D : procedure?
glCompressedTexSubImage3D : procedure?
glConvolutionFilter1D : procedure?
glConvolutionFilter2D : procedure?
glConvolutionParameterf : procedure?
glConvolutionParameterfv : procedure?
glConvolutionParameteri : procedure?
glConvolutionParameteriv : procedure?
glCopyColorSubTable : procedure?
glCopyColorTable : procedure?
glCopyConvolutionFilter1D : procedure?
glCopyConvolutionFilter2D : procedure?
glCopyPixels : procedure?
glCopyTexImage1D : procedure?
```

```
glCopyTexImage2D : procedure?
glCopyTexSubImage1D : procedure?
glCopyTexSubImage2D : procedure?
glCopyTexSubImage3D : procedure?
glCullFace : procedure?
glDeleteLists : procedure?
glDepthFunc : procedure?
glDepthMask : procedure?
glDepthRange : procedure?
glDisable : procedure?
glDrawBuffer : procedure?
glDrawPixels : procedure?
glEdgeFlag : procedure?
glEdgeFlagv : procedure?
glEnable : procedure?
glEnd : procedure?
glEndList : procedure?
glEndQuery : procedure?
glEvalCoord1d : procedure?
glEvalCoord1dv : procedure?
glEvalCoord1f : procedure?
glEvalCoord1fv : procedure?
glEvalCoord2d : procedure?
glEvalCoord2dv : procedure?
glEvalCoord2f : procedure?
glEvalCoord2fv : procedure?
glEvalMesh1 : procedure?
glEvalMesh2 : procedure?
glEvalPoint1 : procedure?
glEvalPoint2 : procedure?
glFinish : procedure?
glFlush : procedure?
glFogCoordd : procedure?
glFogCoorddv : procedure?
glFogCoordf : procedure?
glFogCoordfv : procedure?
glFogf : procedure?
glFogfv : procedure?
glFogi : procedure?
glFogiv : procedure?
glFrontFace : procedure?
glFrustum : procedure?
glGenLists : procedure?
glGetColorTable : procedure?
```

```
glGetCompressedTexImage : procedure?
glGetConvolutionFilter : procedure?
glGetError : procedure?
glGetHistogram : procedure?
glGetMinmax : procedure?
glGetPolygonStipple : procedure?
glGetSeparableFilter : procedure?
glGetTexImage : procedure?
glHint : procedure?
glHistogram : procedure?
glIndexMask : procedure?
glIndexd : procedure?
glIndexdv : procedure?
glIndexf : procedure?
glIndexfv : procedure?
glIndexi : procedure?
glIndexiv : procedure?
glIndexs : procedure?
glIndexsv : procedure?
glIndexub : procedure?
glIndexubv : procedure?
glInitNames : procedure?
glIsBuffer : procedure?
glIsEnabled : procedure?
glIsList : procedure?
glIsQuery : procedure?
glIsTexture : procedure?
glLightModelf : procedure?
glLightModelfv : procedure?
glLightModeli : procedure?
glLightModeliv : procedure?
glLightf : procedure?
glLightfv : procedure?
glLighti : procedure?
glLightiv : procedure?
glLineStipple : procedure?
glLineWidth : procedure?
glListBase : procedure?
glLoadIdentity : procedure?
glLoadMatrixd : procedure?
glLoadMatrixf : procedure?
glLoadName : procedure?
glLoadTransposeMatrixd : procedure?
glLoadTransposeMatrixf : procedure?
```

```
glLogicOp : procedure?
glMap1d : procedure?
glMap1f : procedure?
glMap2d : procedure?
glMap2f : procedure?
glMapGrid1d : procedure?
glMapGrid1f : procedure?
glMapGrid2d : procedure?
glMapGrid2f : procedure?
glMaterialf : procedure?
glMaterialfv : procedure?
glMateriali : procedure?
glMaterialiv : procedure?
glMatrixMode : procedure?
glMinmax : procedure?
glMultMatrixd : procedure?
glMultMatrixf : procedure?
glMultTransposeMatrixd : procedure?
glMultTransposeMatrixf : procedure?
glMultiTexCoord1d : procedure?
glMultiTexCoord1dv : procedure?
glMultiTexCoord1f : procedure?
glMultiTexCoord1fv : procedure?
glMultiTexCoord1i : procedure?
glMultiTexCoord1iv : procedure?
glMultiTexCoord1s : procedure?
glMultiTexCoord1sv : procedure?
glMultiTexCoord2d : procedure?
glMultiTexCoord2dv : procedure?
glMultiTexCoord2f : procedure?
glMultiTexCoord2fv : procedure?
glMultiTexCoord2i : procedure?
glMultiTexCoord2iv : procedure?
glMultiTexCoord2s : procedure?
glMultiTexCoord2sv : procedure?
glMultiTexCoord3d : procedure?
glMultiTexCoord3dv : procedure?
glMultiTexCoord3f : procedure?
glMultiTexCoord3fv : procedure?
glMultiTexCoord3i : procedure?
glMultiTexCoord3iv : procedure?
glMultiTexCoord3s : procedure?
glMultiTexCoord3sv : procedure?
glMultiTexCoord4d : procedure?
```

```
glMultiTexCoord4dv : procedure?
glMultiTexCoord4f : procedure?
glMultiTexCoord4fv : procedure?
glMultiTexCoord4i : procedure?
glMultiTexCoord4iv : procedure?
glMultiTexCoord4s : procedure?
glMultiTexCoord4sv : procedure?
glNewList : procedure?
glNormal3b : procedure?
glNormal3bv : procedure?
glNormal3d : procedure?
glNormal3dv : procedure?
glNormal3f : procedure?
glNormal3fv : procedure?
glNormal3i : procedure?
glNormal3iv : procedure?
glNormal3s : procedure?
glNormal3sv : procedure?
glOrtho : procedure?
glPassThrough : procedure?
glPixelStoref : procedure?
glPixelStorei : procedure?
glPixelTransferf : procedure?
glPixelTransferi : procedure?
glPixelZoom : procedure?
glPointParameterf : procedure?
glPointParameterfv : procedure?
glPointParameteri : procedure?
glPointParameteriv : procedure?
glPointSize : procedure?
glPolygonMode : procedure?
glPolygonOffset : procedure?
glPolygonStipple : procedure?
glPopAttrib : procedure?
glPopClientAttrib : procedure?
glPopMatrix : procedure?
glPopName : procedure?
glPushAttrib : procedure?
glPushClientAttrib : procedure?
glPushMatrix : procedure?
glPushName : procedure?
glRasterPos2d : procedure?
glRasterPos2dv : procedure?
glRasterPos2f : procedure?
```

```
glRasterPos2fv : procedure?
glRasterPos2i : procedure?
glRasterPos2iv : procedure?
glRasterPos2s : procedure?
glRasterPos2sv : procedure?
glRasterPos3d : procedure?
glRasterPos3dv : procedure?
glRasterPos3f : procedure?
glRasterPos3fv : procedure?
glRasterPos3i : procedure?
glRasterPos3iv : procedure?
glRasterPos3s : procedure?
glRasterPos3sv : procedure?
glRasterPos4d : procedure?
glRasterPos4dv : procedure?
glRasterPos4f : procedure?
glRasterPos4fv : procedure?
glRasterPos4i : procedure?
glRasterPos4iv : procedure?
glRasterPos4s : procedure?
glRasterPos4sv : procedure?
glReadBuffer : procedure?
glReadPixels : procedure?
glRectd : procedure?
glRectdv : procedure?
glRectf : procedure?
glRectfv : procedure?
glRecti : procedure?
glRectiv : procedure?
glRects : procedure?
glRectsv : procedure?
glRenderMode : procedure?
glResetHistogram : procedure?
glResetMinmax : procedure?
glRotated : procedure?
glRotatef : procedure?
glSampleCoverage : procedure?
glScaled : procedure?
glScalef : procedure?
glScissor : procedure?
glSecondaryColor3b : procedure?
glSecondaryColor3bv : procedure?
glSecondaryColor3d : procedure?
glSecondaryColor3dv : procedure?
```

```
glSecondaryColor3f : procedure?
glSecondaryColor3fv : procedure?
glSecondaryColor3i : procedure?
glSecondaryColor3iv : procedure?
glSecondaryColor3s : procedure?
glSecondaryColor3sv : procedure?
glSecondaryColor3ub : procedure?
glSecondaryColor3ubv : procedure?
glSecondaryColor3ui : procedure?
glSecondaryColor3uiv : procedure?
glSecondaryColor3us : procedure?
glSecondaryColor3usv : procedure?
glSeparableFilter2D : procedure?
glShadeModel : procedure?
glStencilFunc : procedure?
glStencilMask : procedure?
glStencilOp : procedure?
glTexCoord1d : procedure?
glTexCoord1dv : procedure?
glTexCoord1f : procedure?
glTexCoord1fv : procedure?
glTexCoord1i : procedure?
glTexCoord1iv : procedure?
glTexCoord1s : procedure?
glTexCoord1sv : procedure?
glTexCoord2d : procedure?
glTexCoord2dv : procedure?
glTexCoord2f : procedure?
glTexCoord2fv : procedure?
glTexCoord2i : procedure?
glTexCoord2iv : procedure?
glTexCoord2s : procedure?
glTexCoord2sv : procedure?
glTexCoord3d : procedure?
glTexCoord3dv : procedure?
glTexCoord3f : procedure?
glTexCoord3fv : procedure?
glTexCoord3i : procedure?
glTexCoord3iv : procedure?
glTexCoord3s : procedure?
glTexCoord3sv : procedure?
glTexCoord4d : procedure?
glTexCoord4dv : procedure?
glTexCoord4f : procedure?
```

```
glTexCoord4fv : procedure?
glTexCoord4i : procedure?
glTexCoord4iv : procedure?
glTexCoord4s : procedure?
glTexCoord4sv : procedure?
glTexEnvf : procedure?
glTexEnvfv : procedure?
glTexEnvi : procedure?
glTexEnviv : procedure?
glTexGend : procedure?
glTexGendv : procedure?
glTexGenf : procedure?
glTexGenfv : procedure?
glTexGeni : procedure?
glTexGeniv : procedure?
glTexImage1D : procedure?
glTexImage2D : procedure?
glTexImage3D : procedure?
glTexParameterf : procedure?
glTexParameterfv : procedure?
glTexParameteri : procedure?
glTexParameteriv : procedure?
glTexSubImage1D : procedure?
glTexSubImage2D : procedure?
glTexSubImage3D : procedure?
glTranslated : procedure?
glTranslatef : procedure?
glVertex2d : procedure?
glVertex2dv : procedure?
glVertex2f : procedure?
glVertex2fv : procedure?
glVertex2i : procedure?
glVertex2iv : procedure?
glVertex2s : procedure?
glVertex2sv : procedure?
glVertex3d : procedure?
glVertex3dv : procedure?
glVertex3f : procedure?
glVertex3fv : procedure?
glVertex3i : procedure?
glVertex3iv : procedure?
glVertex3s : procedure?
glVertex3sv : procedure?
glVertex4d : procedure?
```

```
glVertex4dv : procedure?
glVertex4f : procedure?
glVertex4fv : procedure?
glVertex4i : procedure?
glVertex4iv : procedure?
glVertex4s : procedure?
glVertex4sv : procedure?
glViewport : procedure?
glWindowPos2d : procedure?
glWindowPos2dv : procedure?
glWindowPos2f : procedure?
glWindowPos2fv : procedure?
glWindowPos2i : procedure?
glWindowPos2iv : procedure?
glWindowPos2s : procedure?
glWindowPos2sv : procedure?
glWindowPos3d : procedure?
glWindowPos3dv : procedure?
glWindowPos3f : procedure?
glWindowPos3fv : procedure?
glWindowPos3i : procedure?
glWindowPos3iv : procedure?
glWindowPos3s : procedure?
glWindowPos3sv : procedure?
gluBuild1DMipmapLevels : procedure?
gluBuild1DMipmaps : procedure?
gluBuild2DMipmapLevels : procedure?
gluBuild2DMipmaps : procedure?
gluBuild3DMipmapLevels : procedure?
gluBuild3DMipmaps : procedure?
gluCylinder : procedure?
gluDisk : procedure?
gluLookAt : procedure?
gluNewQuadric : procedure?
gluOrtho2D : procedure?
gluPartialDisk : procedure?
gluPerspective : procedure?
gluPickMatrix : procedure?
gluQuadricDrawStyle : procedure?
gluQuadricNormals : procedure?
gluQuadricOrientation : procedure?
gluQuadricTexture : procedure?
gluScaleImage : procedure?
gluSphere : procedure?
```

These functions are all direct translations of the C OpenGL API.

```
GL_FALSE : exact-integer?
GL_TRUE  : exact-integer?
GL_BYTE  : exact-integer?
GL_UNSIGNED_BYTE : exact-integer?
GL_SHORT : exact-integer?
GL_UNSIGNED_SHORT : exact-integer?
GL_INT    : exact-integer?
GL_UNSIGNED_INT : exact-integer?
GL_FLOAT  : exact-integer?
GL_DOUBLE : exact-integer?
GL_2_BYTES : exact-integer?
GL_3_BYTES : exact-integer?
GL_4_BYTES : exact-integer?
GL_POINTS  : exact-integer?
GL_LINES   : exact-integer?
GL_LINE_LOOP : exact-integer?
GL_LINE_STRIP : exact-integer?
GL_TRIANGLES : exact-integer?
GL_TRIANGLE_STRIP : exact-integer?
GL_TRIANGLE_FAN : exact-integer?
GL_QUADS    : exact-integer?
GL_QUAD_STRIP : exact-integer?
GL_POLYGON  : exact-integer?
GL_VERTEX_ARRAY : exact-integer?
GL_NORMAL_ARRAY : exact-integer?
GL_COLOR_ARRAY : exact-integer?
GL_INDEX_ARRAY : exact-integer?
GL_TEXTURE_COORD_ARRAY : exact-integer?
GL_EDGE_FLAG_ARRAY : exact-integer?
GL_VERTEX_ARRAY_SIZE : exact-integer?
GL_VERTEX_ARRAY_TYPE : exact-integer?
GL_VERTEX_ARRAY_STRIDE : exact-integer?
GL_NORMAL_ARRAY_TYPE : exact-integer?
GL_NORMAL_ARRAY_STRIDE : exact-integer?
GL_COLOR_ARRAY_SIZE : exact-integer?
GL_COLOR_ARRAY_TYPE : exact-integer?
GL_COLOR_ARRAY_STRIDE : exact-integer?
GL_INDEX_ARRAY_TYPE : exact-integer?
GL_INDEX_ARRAY_STRIDE : exact-integer?
GL_TEXTURE_COORD_ARRAY_SIZE : exact-integer?
GL_TEXTURE_COORD_ARRAY_TYPE : exact-integer?
GL_TEXTURE_COORD_ARRAY_STRIDE : exact-integer?
GL_EDGE_FLAG_ARRAY_STRIDE : exact-integer?
```

GL\_VERTEX\_ARRAY\_POINTER : exact-integer?  
GL\_NORMAL\_ARRAY\_POINTER : exact-integer?  
GL\_COLOR\_ARRAY\_POINTER : exact-integer?  
GL\_INDEX\_ARRAY\_POINTER : exact-integer?  
GL\_TEXTURE\_COORD\_ARRAY\_POINTER : exact-integer?  
GL\_EDGE\_FLAG\_ARRAY\_POINTER : exact-integer?  
GL\_V2F : exact-integer?  
GL\_V3F : exact-integer?  
GL\_C4UB\_V2F : exact-integer?  
GL\_C4UB\_V3F : exact-integer?  
GL\_C3F\_V3F : exact-integer?  
GL\_N3F\_V3F : exact-integer?  
GL\_C4F\_N3F\_V3F : exact-integer?  
GL\_T2F\_V3F : exact-integer?  
GL\_T4F\_V4F : exact-integer?  
GL\_T2F\_C4UB\_V3F : exact-integer?  
GL\_T2F\_C3F\_V3F : exact-integer?  
GL\_T2F\_N3F\_V3F : exact-integer?  
GL\_T2F\_C4F\_N3F\_V3F : exact-integer?  
GL\_T4F\_C4F\_N3F\_V4F : exact-integer?  
GL\_MATRIX\_MODE : exact-integer?  
GL\_MODELVIEW : exact-integer?  
GL\_PROJECTION : exact-integer?  
GL\_TEXTURE : exact-integer?  
GL\_POINT\_SMOOTH : exact-integer?  
GL\_POINT\_SIZE : exact-integer?  
GL\_POINT\_SIZE\_GRANULARITY : exact-integer?  
GL\_POINT\_SIZE\_RANGE : exact-integer?  
GL\_LINE\_SMOOTH : exact-integer?  
GL\_LINE\_STIPPLE : exact-integer?  
GL\_LINE\_STIPPLE\_PATTERN : exact-integer?  
GL\_LINE\_STIPPLE\_REPEAT : exact-integer?  
GL\_LINE\_WIDTH : exact-integer?  
GL\_LINE\_WIDTH\_GRANULARITY : exact-integer?  
GL\_LINE\_WIDTH\_RANGE : exact-integer?  
GL\_POINT : exact-integer?  
GL\_LINE : exact-integer?  
GL\_FILL : exact-integer?  
GL\_CW : exact-integer?  
GL\_CCW : exact-integer?  
GL\_FRONT : exact-integer?  
GL\_BACK : exact-integer?  
GL\_POLYGON\_MODE : exact-integer?  
GL\_POLYGON\_SMOOTH : exact-integer?

GL\_POLYGON\_STIPPLE : exact-integer?  
GL\_EDGE\_FLAG : exact-integer?  
GL\_CULL\_FACE : exact-integer?  
GL\_CULL\_FACE\_MODE : exact-integer?  
GL\_FRONT\_FACE : exact-integer?  
GL\_POLYGON\_OFFSET\_FACTOR : exact-integer?  
GL\_POLYGON\_OFFSET\_UNITS : exact-integer?  
GL\_POLYGON\_OFFSET\_POINT : exact-integer?  
GL\_POLYGON\_OFFSET\_LINE : exact-integer?  
GL\_POLYGON\_OFFSET\_FILL : exact-integer?  
GL\_COMPILE : exact-integer?  
GL\_COMPILE\_AND\_EXECUTE : exact-integer?  
GL\_LIST\_BASE : exact-integer?  
GL\_LIST\_INDEX : exact-integer?  
GL\_LIST\_MODE : exact-integer?  
GL\_NEVER : exact-integer?  
GL\_LESS : exact-integer?  
GL\_EQUAL : exact-integer?  
GL\_LEQUAL : exact-integer?  
GL\_GREATER : exact-integer?  
GL\_NOTEQUAL : exact-integer?  
GL\_GEQUAL : exact-integer?  
GL\_ALWAYS : exact-integer?  
GL\_DEPTH\_TEST : exact-integer?  
GL\_DEPTH\_BITS : exact-integer?  
GL\_DEPTH\_CLEAR\_VALUE : exact-integer?  
GL\_DEPTH\_FUNC : exact-integer?  
GL\_DEPTH\_RANGE : exact-integer?  
GL\_DEPTH\_WRITEMASK : exact-integer?  
GL\_DEPTH\_COMPONENT : exact-integer?  
GL\_LIGHTING : exact-integer?  
GL\_LIGHT0 : exact-integer?  
GL\_LIGHT1 : exact-integer?  
GL\_LIGHT2 : exact-integer?  
GL\_LIGHT3 : exact-integer?  
GL\_LIGHT4 : exact-integer?  
GL\_LIGHT5 : exact-integer?  
GL\_LIGHT6 : exact-integer?  
GL\_LIGHT7 : exact-integer?  
GL\_SPOT\_EXPONENT : exact-integer?  
GL\_SPOT\_CUTOFF : exact-integer?  
GL\_CONSTANT\_ATTENUATION : exact-integer?  
GL\_LINEAR\_ATTENUATION : exact-integer?  
GL\_QUADRATIC\_ATTENUATION : exact-integer?

GL\_AMBIENT : exact-integer?  
GL\_DIFFUSE : exact-integer?  
GL\_SPECULAR : exact-integer?  
GL\_SHININESS : exact-integer?  
GL\_EMISSION : exact-integer?  
GL\_POSITION : exact-integer?  
GL\_SPOT\_DIRECTION : exact-integer?  
GL\_AMBIENT\_AND\_DIFFUSE : exact-integer?  
GL\_COLOR\_INDEXES : exact-integer?  
GL\_LIGHT\_MODEL\_TWO\_SIDE : exact-integer?  
GL\_LIGHT\_MODEL\_LOCAL\_VIEWER : exact-integer?  
GL\_LIGHT\_MODEL\_AMBIENT : exact-integer?  
GL\_FRONT\_AND\_BACK : exact-integer?  
GL\_SHADE\_MODEL : exact-integer?  
GL\_FLAT : exact-integer?  
GL\_SMOOTH : exact-integer?  
GL\_COLOR\_MATERIAL : exact-integer?  
GL\_COLOR\_MATERIAL\_FACE : exact-integer?  
GL\_COLOR\_MATERIAL\_PARAMETER : exact-integer?  
GL\_NORMALIZE : exact-integer?  
GL\_CLIP\_PLANE0 : exact-integer?  
GL\_CLIP\_PLANE1 : exact-integer?  
GL\_CLIP\_PLANE2 : exact-integer?  
GL\_CLIP\_PLANE3 : exact-integer?  
GL\_CLIP\_PLANE4 : exact-integer?  
GL\_CLIP\_PLANE5 : exact-integer?  
GL\_ACCUM\_RED\_BITS : exact-integer?  
GL\_ACCUM\_GREEN\_BITS : exact-integer?  
GL\_ACCUM\_BLUE\_BITS : exact-integer?  
GL\_ACCUM\_ALPHA\_BITS : exact-integer?  
GL\_ACCUM\_CLEAR\_VALUE : exact-integer?  
GL\_ACCUM : exact-integer?  
GL\_ADD : exact-integer?  
GL\_LOAD : exact-integer?  
GL\_MULT : exact-integer?  
GL\_RETURN : exact-integer?  
GL\_ALPHA\_TEST : exact-integer?  
GL\_ALPHA\_TEST\_REF : exact-integer?  
GL\_ALPHA\_TEST\_FUNC : exact-integer?  
GL\_BLEND : exact-integer?  
GL\_BLEND\_SRC : exact-integer?  
GL\_BLEND\_DST : exact-integer?  
GL\_ZERO : exact-integer?  
GL\_ONE : exact-integer?

```
GL_SRC_COLOR : exact-integer?
GL_ONE_MINUS_SRC_COLOR : exact-integer?
GL_SRC_ALPHA : exact-integer?
GL_ONE_MINUS_SRC_ALPHA : exact-integer?
GL_DST_ALPHA : exact-integer?
GL_ONE_MINUS_DST_ALPHA : exact-integer?
GL_DST_COLOR : exact-integer?
GL_ONE_MINUS_DST_COLOR : exact-integer?
GL_SRC_ALPHA_SATURATE : exact-integer?
GL_FEEDBACK : exact-integer?
GL_RENDER : exact-integer?
GL_SELECT : exact-integer?
GL_2D : exact-integer?
GL_3D : exact-integer?
GL_3D_COLOR : exact-integer?
GL_3D_COLOR_TEXTURE : exact-integer?
GL_4D_COLOR_TEXTURE : exact-integer?
GL_POINT_TOKEN : exact-integer?
GL_LINE_TOKEN : exact-integer?
GL_LINE_RESET_TOKEN : exact-integer?
GL_POLYGON_TOKEN : exact-integer?
GL_BITMAP_TOKEN : exact-integer?
GL_DRAW_PIXEL_TOKEN : exact-integer?
GL_COPY_PIXEL_TOKEN : exact-integer?
GL_PASS_THROUGH_TOKEN : exact-integer?
GL_FEEDBACK_BUFFER_POINTER : exact-integer?
GL_FEEDBACK_BUFFER_SIZE : exact-integer?
GL_FEEDBACK_BUFFER_TYPE : exact-integer?
GL_SELECTION_BUFFER_POINTER : exact-integer?
GL_SELECTION_BUFFER_SIZE : exact-integer?
GL_FOG : exact-integer?
GL_FOG_MODE : exact-integer?
GL_FOG_DENSITY : exact-integer?
GL_FOG_COLOR : exact-integer?
GL_FOG_INDEX : exact-integer?
GL_FOG_START : exact-integer?
GL_FOG_END : exact-integer?
GL_LINEAR : exact-integer?
GL_EXP : exact-integer?
GL_EXP2 : exact-integer?
GL_LOGIC_OP : exact-integer?
GL_INDEX_LOGIC_OP : exact-integer?
GL_COLOR_LOGIC_OP : exact-integer?
GL_LOGIC_OP_MODE : exact-integer?
```

```
GL_CLEAR : exact-integer?
GL_SET : exact-integer?
GL_COPY : exact-integer?
GL_COPY_INVERTED : exact-integer?
GL_NOOP : exact-integer?
GL_INVERT : exact-integer?
GL_AND : exact-integer?
GL_NAND : exact-integer?
GL_OR : exact-integer?
GL_NOR : exact-integer?
GL_XOR : exact-integer?
GL_EQUIV : exact-integer?
GL_AND_REVERSE : exact-integer?
GL_AND_INVERTED : exact-integer?
GL_OR_REVERSE : exact-integer?
GL_OR_INVERTED : exact-integer?
GL_STENCIL_TEST : exact-integer?
GL_STENCIL_WRITEMASK : exact-integer?
GL_STENCIL_BITS : exact-integer?
GL_STENCIL_FUNC : exact-integer?
GL_STENCIL_VALUE_MASK : exact-integer?
GL_STENCIL_REF : exact-integer?
GL_STENCIL_FAIL : exact-integer?
GL_STENCIL_PASS_DEPTH_PASS : exact-integer?
GL_STENCIL_PASS_DEPTH_FAIL : exact-integer?
GL_STENCIL_CLEAR_VALUE : exact-integer?
GL_STENCIL_INDEX : exact-integer?
GL_KEEP : exact-integer?
GL_REPLACE : exact-integer?
GL_INCR : exact-integer?
GL_DECR : exact-integer?
GL_NONE : exact-integer?
GL_LEFT : exact-integer?
GL_RIGHT : exact-integer?
GL_FRONT_LEFT : exact-integer?
GL_FRONT_RIGHT : exact-integer?
GL_BACK_LEFT : exact-integer?
GL_BACK_RIGHT : exact-integer?
GL_AUX0 : exact-integer?
GL_AUX1 : exact-integer?
GL_AUX2 : exact-integer?
GL_AUX3 : exact-integer?
GL_COLOR_INDEX : exact-integer?
GL_RED : exact-integer?
```

```
GL_GREEN : exact-integer?
GL_BLUE : exact-integer?
GL_ALPHA : exact-integer?
GL_LUMINANCE : exact-integer?
GL_LUMINANCE_ALPHA : exact-integer?
GL_ALPHA_BITS : exact-integer?
GL_RED_BITS : exact-integer?
GL_GREEN_BITS : exact-integer?
GL_BLUE_BITS : exact-integer?
GL_INDEX_BITS : exact-integer?
GL_SUBPIXEL_BITS : exact-integer?
GL_AUX_BUFFERS : exact-integer?
GL_READ_BUFFER : exact-integer?
GL_DRAW_BUFFER : exact-integer?
GL_DOUBLEBUFFER : exact-integer?
GL_STEREO : exact-integer?
GL_BITMAP : exact-integer?
GL_COLOR : exact-integer?
GL_DEPTH : exact-integer?
GL_STENCIL : exact-integer?
GL_DITHER : exact-integer?
GL_RGB : exact-integer?
GL_RGBA : exact-integer?
GL_MAX_LIST_NESTING : exact-integer?
GL_MAX_ATTRIB_STACK_DEPTH : exact-integer?
GL_MAX_MODELVIEW_STACK_DEPTH : exact-integer?
GL_MAX_NAME_STACK_DEPTH : exact-integer?
GL_MAX_PROJECTION_STACK_DEPTH : exact-integer?
GL_MAX_TEXTURE_STACK_DEPTH : exact-integer?
GL_MAX_EVAL_ORDER : exact-integer?
GL_MAX_LIGHTS : exact-integer?
GL_MAX_CLIP_PLANES : exact-integer?
GL_MAX_TEXTURE_SIZE : exact-integer?
GL_MAX_PIXEL_MAP_TABLE : exact-integer?
GL_MAX_VIEWPORT_DIMS : exact-integer?
GL_MAX_CLIENT_ATTRIB_STACK_DEPTH : exact-integer?
GL_ATTRIB_STACK_DEPTH : exact-integer?
GL_CLIENT_ATTRIB_STACK_DEPTH : exact-integer?
GL_COLOR_CLEAR_VALUE : exact-integer?
GL_COLOR_WRITEMASK : exact-integer?
GL_CURRENT_INDEX : exact-integer?
GL_CURRENT_COLOR : exact-integer?
GL_CURRENT_NORMAL : exact-integer?
GL_CURRENT_RASTER_COLOR : exact-integer?
```

GL\_CURRENT\_RASTER\_DISTANCE : exact-integer?  
GL\_CURRENT\_RASTER\_INDEX : exact-integer?  
GL\_CURRENT\_RASTER\_POSITION : exact-integer?  
GL\_CURRENT\_RASTER\_TEXTURE\_COORDS : exact-integer?  
GL\_CURRENT\_RASTER\_POSITION\_VALID : exact-integer?  
GL\_CURRENT\_TEXTURE\_COORDS : exact-integer?  
GL\_INDEX\_CLEAR\_VALUE : exact-integer?  
GL\_INDEX\_MODE : exact-integer?  
GL\_INDEX\_WRITEMASK : exact-integer?  
GL\_MODELVIEW\_MATRIX : exact-integer?  
GL\_MODELVIEW\_STACK\_DEPTH : exact-integer?  
GL\_NAME\_STACK\_DEPTH : exact-integer?  
GL\_PROJECTION\_MATRIX : exact-integer?  
GL\_PROJECTION\_STACK\_DEPTH : exact-integer?  
GL\_RENDER\_MODE : exact-integer?  
GL\_RGBA\_MODE : exact-integer?  
GL\_TEXTURE\_MATRIX : exact-integer?  
GL\_TEXTURE\_STACK\_DEPTH : exact-integer?  
GL\_VIEWPORT : exact-integer?  
GL\_AUTO\_NORMAL : exact-integer?  
GL\_MAP1\_COLOR\_4 : exact-integer?  
GL\_MAP1\_GRID\_DOMAIN : exact-integer?  
GL\_MAP1\_GRID\_SEGMENTS : exact-integer?  
GL\_MAP1\_INDEX : exact-integer?  
GL\_MAP1\_NORMAL : exact-integer?  
GL\_MAP1\_TEXTURE\_COORD\_1 : exact-integer?  
GL\_MAP1\_TEXTURE\_COORD\_2 : exact-integer?  
GL\_MAP1\_TEXTURE\_COORD\_3 : exact-integer?  
GL\_MAP1\_TEXTURE\_COORD\_4 : exact-integer?  
GL\_MAP1\_VERTEX\_3 : exact-integer?  
GL\_MAP1\_VERTEX\_4 : exact-integer?  
GL\_MAP2\_COLOR\_4 : exact-integer?  
GL\_MAP2\_GRID\_DOMAIN : exact-integer?  
GL\_MAP2\_GRID\_SEGMENTS : exact-integer?  
GL\_MAP2\_INDEX : exact-integer?  
GL\_MAP2\_NORMAL : exact-integer?  
GL\_MAP2\_TEXTURE\_COORD\_1 : exact-integer?  
GL\_MAP2\_TEXTURE\_COORD\_2 : exact-integer?  
GL\_MAP2\_TEXTURE\_COORD\_3 : exact-integer?  
GL\_MAP2\_TEXTURE\_COORD\_4 : exact-integer?  
GL\_MAP2\_VERTEX\_3 : exact-integer?  
GL\_MAP2\_VERTEX\_4 : exact-integer?  
GL\_COEFF : exact-integer?  
GL\_DOMAIN : exact-integer?

GL\_ORDER : exact-integer?  
GL\_FOG\_HINT : exact-integer?  
GL\_LINE\_SMOOTH\_HINT : exact-integer?  
GL\_PERSPECTIVE\_CORRECTION\_HINT : exact-integer?  
GL\_POINT\_SMOOTH\_HINT : exact-integer?  
GL\_POLYGON\_SMOOTH\_HINT : exact-integer?  
GL\_DONT\_CARE : exact-integer?  
GL\_FASTEST : exact-integer?  
GL\_NICEST : exact-integer?  
GL\_SCISSOR\_TEST : exact-integer?  
GL\_SCISSOR\_BOX : exact-integer?  
GL\_MAP\_COLOR : exact-integer?  
GL\_MAP\_STENCIL : exact-integer?  
GL\_INDEX\_SHIFT : exact-integer?  
GL\_INDEX\_OFFSET : exact-integer?  
GL\_RED\_SCALE : exact-integer?  
GL\_RED\_BIAS : exact-integer?  
GL\_GREEN\_SCALE : exact-integer?  
GL\_GREEN\_BIAS : exact-integer?  
GL\_BLUE\_SCALE : exact-integer?  
GL\_BLUE\_BIAS : exact-integer?  
GL\_ALPHA\_SCALE : exact-integer?  
GL\_ALPHA\_BIAS : exact-integer?  
GL\_DEPTH\_SCALE : exact-integer?  
GL\_DEPTH\_BIAS : exact-integer?  
GL\_PIXEL\_MAP\_S\_TO\_S\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_I\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_R\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_G\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_B\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_A\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_R\_TO\_R\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_G\_TO\_G\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_B\_TO\_B\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_A\_TO\_A\_SIZE : exact-integer?  
GL\_PIXEL\_MAP\_S\_TO\_S : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_I : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_R : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_G : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_B : exact-integer?  
GL\_PIXEL\_MAP\_I\_TO\_A : exact-integer?  
GL\_PIXEL\_MAP\_R\_TO\_R : exact-integer?  
GL\_PIXEL\_MAP\_G\_TO\_G : exact-integer?  
GL\_PIXEL\_MAP\_B\_TO\_B : exact-integer?

GL\_PIXEL\_MAP\_A\_TO\_A : exact-integer?  
GL\_PACK\_ALIGNMENT : exact-integer?  
GL\_PACK\_LSB\_FIRST : exact-integer?  
GL\_PACK\_ROW\_LENGTH : exact-integer?  
GL\_PACK\_SKIP\_PIXELS : exact-integer?  
GL\_PACK\_SKIP\_ROWS : exact-integer?  
GL\_PACK\_SWAP\_BYTES : exact-integer?  
GL\_UNPACK\_ALIGNMENT : exact-integer?  
GL\_UNPACK\_LSB\_FIRST : exact-integer?  
GL\_UNPACK\_ROW\_LENGTH : exact-integer?  
GL\_UNPACK\_SKIP\_PIXELS : exact-integer?  
GL\_UNPACK\_SKIP\_ROWS : exact-integer?  
GL\_UNPACK\_SWAP\_BYTES : exact-integer?  
GL\_ZOOM\_X : exact-integer?  
GL\_ZOOM\_Y : exact-integer?  
GL\_TEXTURE\_ENV : exact-integer?  
GL\_TEXTURE\_ENV\_MODE : exact-integer?  
GL\_TEXTURE\_1D : exact-integer?  
GL\_TEXTURE\_2D : exact-integer?  
GL\_TEXTURE\_WRAP\_S : exact-integer?  
GL\_TEXTURE\_WRAP\_T : exact-integer?  
GL\_TEXTURE\_MAG\_FILTER : exact-integer?  
GL\_TEXTURE\_MIN\_FILTER : exact-integer?  
GL\_TEXTURE\_ENV\_COLOR : exact-integer?  
GL\_TEXTURE\_GEN\_S : exact-integer?  
GL\_TEXTURE\_GEN\_T : exact-integer?  
GL\_TEXTURE\_GEN\_MODE : exact-integer?  
GL\_TEXTURE\_BORDER\_COLOR : exact-integer?  
GL\_TEXTURE\_WIDTH : exact-integer?  
GL\_TEXTURE\_HEIGHT : exact-integer?  
GL\_TEXTURE\_BORDER : exact-integer?  
GL\_TEXTURE\_COMPONENTS : exact-integer?  
GL\_TEXTURE\_RED\_SIZE : exact-integer?  
GL\_TEXTURE\_GREEN\_SIZE : exact-integer?  
GL\_TEXTURE\_BLUE\_SIZE : exact-integer?  
GL\_TEXTURE\_ALPHA\_SIZE : exact-integer?  
GL\_TEXTURE\_LUMINANCE\_SIZE : exact-integer?  
GL\_TEXTURE\_INTENSITY\_SIZE : exact-integer?  
GL\_NEAREST\_MIPMAP\_NEAREST : exact-integer?  
GL\_NEAREST\_MIPMAP\_LINEAR : exact-integer?  
GL\_LINEAR\_MIPMAP\_NEAREST : exact-integer?  
GL\_LINEAR\_MIPMAP\_LINEAR : exact-integer?  
GL\_OBJECT\_LINEAR : exact-integer?  
GL\_OBJECT\_PLANE : exact-integer?

```
GL_EYE_LINEAR : exact-integer?
GL_EYE_PLANE : exact-integer?
GL_SPHERE_MAP : exact-integer?
GL_DECAL : exact-integer?
GL_MODULATE : exact-integer?
GL_NEAREST : exact-integer?
GL_REPEAT : exact-integer?
GL_CLAMP : exact-integer?
GL_S : exact-integer?
GL_T : exact-integer?
GL_R : exact-integer?
GL_Q : exact-integer?
GL_TEXTURE_GEN_R : exact-integer?
GL_TEXTURE_GEN_Q : exact-integer?
GL_VENDOR : exact-integer?
GL_RENDERER : exact-integer?
GL_VERSION : exact-integer?
GL_EXTENSIONS : exact-integer?
GL_NO_ERROR : exact-integer?
GL_INVALID_VALUE : exact-integer?
GL_INVALID_ENUM : exact-integer?
GL_INVALID_OPERATION : exact-integer?
GL_STACK_OVERFLOW : exact-integer?
GL_STACK_UNDERFLOW : exact-integer?
GL_OUT_OF_MEMORY : exact-integer?
GL_CURRENT_BIT : exact-integer?
GL_POINT_BIT : exact-integer?
GL_LINE_BIT : exact-integer?
GL_POLYGON_BIT : exact-integer?
GL_POLYGON_STIPPLE_BIT : exact-integer?
GL_PIXEL_MODE_BIT : exact-integer?
GL_LIGHTING_BIT : exact-integer?
GL_FOG_BIT : exact-integer?
GL_DEPTH_BUFFER_BIT : exact-integer?
GL_ACCUM_BUFFER_BIT : exact-integer?
GL_STENCIL_BUFFER_BIT : exact-integer?
GL_VIEWPORT_BIT : exact-integer?
GL_TRANSFORM_BIT : exact-integer?
GL_ENABLE_BIT : exact-integer?
GL_COLOR_BUFFER_BIT : exact-integer?
GL_HINT_BIT : exact-integer?
GL_EVAL_BIT : exact-integer?
GL_LIST_BIT : exact-integer?
GL_TEXTURE_BIT : exact-integer?
```

GL\_SCISSOR\_BIT : exact-integer?  
GL\_ALL\_ATTRIB\_BITS : exact-integer?  
GL\_PROXY\_TEXTURE\_1D : exact-integer?  
GL\_PROXY\_TEXTURE\_2D : exact-integer?  
GL\_TEXTURE\_PRIORITY : exact-integer?  
GL\_TEXTURE\_RESIDENT : exact-integer?  
GL\_TEXTURE\_BINDING\_1D : exact-integer?  
GL\_TEXTURE\_BINDING\_2D : exact-integer?  
GL\_TEXTURE\_INTERNAL\_FORMAT : exact-integer?  
GL\_ALPHA4 : exact-integer?  
GL\_ALPHA8 : exact-integer?  
GL\_ALPHA12 : exact-integer?  
GL\_ALPHA16 : exact-integer?  
GL\_LUMINANCE4 : exact-integer?  
GL\_LUMINANCE8 : exact-integer?  
GL\_LUMINANCE12 : exact-integer?  
GL\_LUMINANCE16 : exact-integer?  
GL\_LUMINANCE4\_ALPHA4 : exact-integer?  
GL\_LUMINANCE6\_ALPHA2 : exact-integer?  
GL\_LUMINANCE8\_ALPHA8 : exact-integer?  
GL\_LUMINANCE12\_ALPHA4 : exact-integer?  
GL\_LUMINANCE12\_ALPHA12 : exact-integer?  
GL\_LUMINANCE16\_ALPHA16 : exact-integer?  
GL\_INTENSITY : exact-integer?  
GL\_INTENSITY4 : exact-integer?  
GL\_INTENSITY8 : exact-integer?  
GL\_INTENSITY12 : exact-integer?  
GL\_INTENSITY16 : exact-integer?  
GL\_R3\_G3\_B2 : exact-integer?  
GL\_RGB4 : exact-integer?  
GL\_RGB5 : exact-integer?  
GL\_RGB8 : exact-integer?  
GL\_RGB10 : exact-integer?  
GL\_RGB12 : exact-integer?  
GL\_RGB16 : exact-integer?  
GL\_RGBA2 : exact-integer?  
GL\_RGBA4 : exact-integer?  
GL\_RGB5\_A1 : exact-integer?  
GL\_RGBA8 : exact-integer?  
GL\_RGB10\_A2 : exact-integer?  
GL\_RGBA12 : exact-integer?  
GL\_RGBA16 : exact-integer?  
GL\_CLIENT\_PIXEL\_STORE\_BIT : exact-integer?  
GL\_CLIENT\_VERTEX\_ARRAY\_BIT : exact-integer?

GL\_ALL\_CLIENT\_ATTRIB\_BITS : exact-integer?  
GL\_CLIENT\_ALL\_ATTRIB\_BITS : exact-integer?  
GL\_UNSIGNED\_BYTE\_3\_3\_2 : exact-integer?  
GL\_UNSIGNED\_SHORT\_4\_4\_4\_4 : exact-integer?  
GL\_UNSIGNED\_SHORT\_5\_5\_5\_1 : exact-integer?  
GL\_UNSIGNED\_INT\_8\_8\_8\_8 : exact-integer?  
GL\_UNSIGNED\_INT\_10\_10\_10\_2 : exact-integer?  
GL\_RESCALE\_NORMAL : exact-integer?  
GL\_TEXTURE\_BINDING\_3D : exact-integer?  
GL\_PACK\_SKIP\_IMAGES : exact-integer?  
GL\_PACK\_IMAGE\_HEIGHT : exact-integer?  
GL\_UNPACK\_SKIP\_IMAGES : exact-integer?  
GL\_UNPACK\_IMAGE\_HEIGHT : exact-integer?  
GL\_TEXTURE\_3D : exact-integer?  
GL\_PROXY\_TEXTURE\_3D : exact-integer?  
GL\_TEXTURE\_DEPTH : exact-integer?  
GL\_TEXTURE\_WRAP\_R : exact-integer?  
GL\_MAX\_3D\_TEXTURE\_SIZE : exact-integer?  
GL\_UNSIGNED\_BYTE\_2\_3\_3\_REV : exact-integer?  
GL\_UNSIGNED\_SHORT\_5\_6\_5 : exact-integer?  
GL\_UNSIGNED\_SHORT\_5\_6\_5\_REV : exact-integer?  
GL\_UNSIGNED\_SHORT\_4\_4\_4\_4\_REV : exact-integer?  
GL\_UNSIGNED\_SHORT\_1\_5\_5\_5\_REV : exact-integer?  
GL\_UNSIGNED\_INT\_8\_8\_8\_8\_REV : exact-integer?  
GL\_UNSIGNED\_INT\_2\_10\_10\_10\_REV : exact-integer?  
GL\_BGR : exact-integer?  
GL\_BGRA : exact-integer?  
GL\_MAX\_ELEMENTS\_VERTICES : exact-integer?  
GL\_MAX\_ELEMENTS\_INDICES : exact-integer?  
GL\_CLAMP\_TO\_EDGE : exact-integer?  
GL\_TEXTURE\_MIN\_LOD : exact-integer?  
GL\_TEXTURE\_MAX\_LOD : exact-integer?  
GL\_TEXTURE\_BASE\_LEVEL : exact-integer?  
GL\_TEXTURE\_MAX\_LEVEL : exact-integer?  
GL\_LIGHT\_MODEL\_COLOR\_CONTROL : exact-integer?  
GL\_SINGLE\_COLOR : exact-integer?  
GL\_SEPARATE\_SPECULAR\_COLOR : exact-integer?  
GL\_SMOOTH\_POINT\_SIZE\_RANGE : exact-integer?  
GL\_SMOOTH\_POINT\_SIZE\_GRANULARITY : exact-integer?  
GL\_SMOOTH\_LINE\_WIDTH\_RANGE : exact-integer?  
GL\_SMOOTH\_LINE\_WIDTH\_GRANULARITY : exact-integer?  
GL\_ALIASED\_POINT\_SIZE\_RANGE : exact-integer?  
GL\_ALIASED\_LINE\_WIDTH\_RANGE : exact-integer?  
GL\_CONSTANT\_COLOR : exact-integer?

GL\_ONE\_MINUS\_CONSTANT\_COLOR : exact-integer?  
GL\_CONSTANT\_ALPHA : exact-integer?  
GL\_ONE\_MINUS\_CONSTANT\_ALPHA : exact-integer?  
GL\_BLEND\_COLOR : exact-integer?  
GL\_FUNC\_ADD : exact-integer?  
GL\_MIN : exact-integer?  
GL\_MAX : exact-integer?  
GL\_BLEND\_EQUATION : exact-integer?  
GL\_FUNC\_SUBTRACT : exact-integer?  
GL\_FUNC\_REVERSE\_SUBTRACT : exact-integer?  
GL\_CONVOLUTION\_1D : exact-integer?  
GL\_CONVOLUTION\_2D : exact-integer?  
GL\_SEPARABLE\_2D : exact-integer?  
GL\_CONVOLUTION\_BORDER\_MODE : exact-integer?  
GL\_CONVOLUTION\_FILTER\_SCALE : exact-integer?  
GL\_CONVOLUTION\_FILTER\_BIAS : exact-integer?  
GL\_REDUCE : exact-integer?  
GL\_CONVOLUTION\_FORMAT : exact-integer?  
GL\_CONVOLUTION\_WIDTH : exact-integer?  
GL\_CONVOLUTION\_HEIGHT : exact-integer?  
GL\_MAX\_CONVOLUTION\_WIDTH : exact-integer?  
GL\_MAX\_CONVOLUTION\_HEIGHT : exact-integer?  
GL\_POST\_CONVOLUTION\_RED\_SCALE : exact-integer?  
GL\_POST\_CONVOLUTION\_GREEN\_SCALE : exact-integer?  
GL\_POST\_CONVOLUTION\_BLUE\_SCALE : exact-integer?  
GL\_POST\_CONVOLUTION\_ALPHA\_SCALE : exact-integer?  
GL\_POST\_CONVOLUTION\_RED\_BIAS : exact-integer?  
GL\_POST\_CONVOLUTION\_GREEN\_BIAS : exact-integer?  
GL\_POST\_CONVOLUTION\_BLUE\_BIAS : exact-integer?  
GL\_POST\_CONVOLUTION\_ALPHA\_BIAS : exact-integer?  
GL\_HISTOGRAM : exact-integer?  
GL\_PROXY\_HISTOGRAM : exact-integer?  
GL\_HISTOGRAM\_WIDTH : exact-integer?  
GL\_HISTOGRAM\_FORMAT : exact-integer?  
GL\_HISTOGRAM\_RED\_SIZE : exact-integer?  
GL\_HISTOGRAM\_GREEN\_SIZE : exact-integer?  
GL\_HISTOGRAM\_BLUE\_SIZE : exact-integer?  
GL\_HISTOGRAM\_ALPHA\_SIZE : exact-integer?  
GL\_HISTOGRAM\_LUMINANCE\_SIZE : exact-integer?  
GL\_HISTOGRAM\_SINK : exact-integer?  
GL\_MINMAX : exact-integer?  
GL\_MINMAX\_FORMAT : exact-integer?  
GL\_MINMAX\_SINK : exact-integer?  
GL\_TABLE\_TOO\_LARGE : exact-integer?

GL\_COLOR\_MATRIX : exact-integer?  
GL\_COLOR\_MATRIX\_STACK\_DEPTH : exact-integer?  
GL\_MAX\_COLOR\_MATRIX\_STACK\_DEPTH : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_RED\_SCALE : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_GREEN\_SCALE : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_BLUE\_SCALE : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_ALPHA\_SCALE : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_RED\_BIAS : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_GREEN\_BIAS : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_BLUE\_BIAS : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_ALPHA\_BIAS : exact-integer?  
GL\_COLOR\_TABLE : exact-integer?  
GL\_POST\_CONVOLUTION\_COLOR\_TABLE : exact-integer?  
GL\_POST\_COLOR\_MATRIX\_COLOR\_TABLE : exact-integer?  
GL\_PROXY\_COLOR\_TABLE : exact-integer?  
GL\_PROXY\_POST\_CONVOLUTION\_COLOR\_TABLE : exact-integer?  
GL\_PROXY\_POST\_COLOR\_MATRIX\_COLOR\_TABLE : exact-integer?  
GL\_COLOR\_TABLE\_SCALE : exact-integer?  
GL\_COLOR\_TABLE\_BIAS : exact-integer?  
GL\_COLOR\_TABLE\_FORMAT : exact-integer?  
GL\_COLOR\_TABLE\_WIDTH : exact-integer?  
GL\_COLOR\_TABLE\_RED\_SIZE : exact-integer?  
GL\_COLOR\_TABLE\_GREEN\_SIZE : exact-integer?  
GL\_COLOR\_TABLE\_BLUE\_SIZE : exact-integer?  
GL\_COLOR\_TABLE\_ALPHA\_SIZE : exact-integer?  
GL\_COLOR\_TABLE\_LUMINANCE\_SIZE : exact-integer?  
GL\_COLOR\_TABLE\_INTENSITY\_SIZE : exact-integer?  
GL\_CONSTANT\_BORDER : exact-integer?  
GL\_REPLICATE\_BORDER : exact-integer?  
GL\_CONVOLUTION\_BORDER\_COLOR : exact-integer?  
GL\_TEXTURE0 : exact-integer?  
GL\_TEXTURE1 : exact-integer?  
GL\_TEXTURE2 : exact-integer?  
GL\_TEXTURE3 : exact-integer?  
GL\_TEXTURE4 : exact-integer?  
GL\_TEXTURE5 : exact-integer?  
GL\_TEXTURE6 : exact-integer?  
GL\_TEXTURE7 : exact-integer?  
GL\_TEXTURE8 : exact-integer?  
GL\_TEXTURE9 : exact-integer?  
GL\_TEXTURE10 : exact-integer?  
GL\_TEXTURE11 : exact-integer?  
GL\_TEXTURE12 : exact-integer?  
GL\_TEXTURE13 : exact-integer?

```
GL_TEXTURE14 : exact-integer?
GL_TEXTURE15 : exact-integer?
GL_TEXTURE16 : exact-integer?
GL_TEXTURE17 : exact-integer?
GL_TEXTURE18 : exact-integer?
GL_TEXTURE19 : exact-integer?
GL_TEXTURE20 : exact-integer?
GL_TEXTURE21 : exact-integer?
GL_TEXTURE22 : exact-integer?
GL_TEXTURE23 : exact-integer?
GL_TEXTURE24 : exact-integer?
GL_TEXTURE25 : exact-integer?
GL_TEXTURE26 : exact-integer?
GL_TEXTURE27 : exact-integer?
GL_TEXTURE28 : exact-integer?
GL_TEXTURE29 : exact-integer?
GL_TEXTURE30 : exact-integer?
GL_TEXTURE31 : exact-integer?
GL_ACTIVE_TEXTURE : exact-integer?
GL_CLIENT_ACTIVE_TEXTURE : exact-integer?
GL_MAX_TEXTURE_UNITS : exact-integer?
GL_TRANSPOSE_MODELVIEW_MATRIX : exact-integer?
GL_TRANSPOSE_PROJECTION_MATRIX : exact-integer?
GL_TRANSPOSE_TEXTURE_MATRIX : exact-integer?
GL_TRANSPOSE_COLOR_MATRIX : exact-integer?
GL_MULTISAMPLE : exact-integer?
GL_SAMPLE_ALPHA_TO_COVERAGE : exact-integer?
GL_SAMPLE_ALPHA_TO_ONE : exact-integer?
GL_SAMPLE_COVERAGE : exact-integer?
GL_SAMPLE_BUFFERS : exact-integer?
GL_SAMPLES : exact-integer?
GL_SAMPLE_COVERAGE_VALUE : exact-integer?
GL_SAMPLE_COVERAGE_INVERT : exact-integer?
GL_MULTISAMPLE_BIT : exact-integer?
GL_NORMAL_MAP : exact-integer?
GL_REFLECTION_MAP : exact-integer?
GL_TEXTURE_CUBE_MAP : exact-integer?
GL_TEXTURE_BINDING_CUBE_MAP : exact-integer?
GL_TEXTURE_CUBE_MAP_POSITIVE_X : exact-integer?
GL_TEXTURE_CUBE_MAP_NEGATIVE_X : exact-integer?
GL_TEXTURE_CUBE_MAP_POSITIVE_Y : exact-integer?
GL_TEXTURE_CUBE_MAP_NEGATIVE_Y : exact-integer?
GL_TEXTURE_CUBE_MAP_POSITIVE_Z : exact-integer?
GL_TEXTURE_CUBE_MAP_NEGATIVE_Z : exact-integer?
```

GL\_PROXY\_TEXTURE\_CUBE\_MAP : exact-integer?  
GL\_MAX\_CUBE\_MAP\_TEXTURE\_SIZE : exact-integer?  
GL\_COMPRESSED\_ALPHA : exact-integer?  
GL\_COMPRESSED\_LUMINANCE : exact-integer?  
GL\_COMPRESSED\_LUMINANCE\_ALPHA : exact-integer?  
GL\_COMPRESSED\_INTENSITY : exact-integer?  
GL\_COMPRESSED\_RGB : exact-integer?  
GL\_COMPRESSED\_RGBA : exact-integer?  
GL\_TEXTURE\_COMPRESSION\_HINT : exact-integer?  
GL\_TEXTURE\_COMPRESSED\_IMAGE\_SIZE : exact-integer?  
GL\_TEXTURE\_COMPRESSED : exact-integer?  
GL\_NUM\_COMPRESSED\_TEXTURE\_FORMATS : exact-integer?  
GL\_COMPRESSED\_TEXTURE\_FORMATS : exact-integer?  
GL\_CLAMP\_TO\_BORDER : exact-integer?  
GL\_COMBINE : exact-integer?  
GL\_COMBINE\_RGB : exact-integer?  
GL\_COMBINE\_ALPHA : exact-integer?  
GL\_SOURCE0\_RGB : exact-integer?  
GL\_SOURCE1\_RGB : exact-integer?  
GL\_SOURCE2\_RGB : exact-integer?  
GL\_SOURCE0\_ALPHA : exact-integer?  
GL\_SOURCE1\_ALPHA : exact-integer?  
GL\_SOURCE2\_ALPHA : exact-integer?  
GL\_OPERAND0\_RGB : exact-integer?  
GL\_OPERAND1\_RGB : exact-integer?  
GL\_OPERAND2\_RGB : exact-integer?  
GL\_OPERAND0\_ALPHA : exact-integer?  
GL\_OPERAND1\_ALPHA : exact-integer?  
GL\_OPERAND2\_ALPHA : exact-integer?  
GL\_RGB\_SCALE : exact-integer?  
GL\_ADD\_SIGNED : exact-integer?  
GL\_INTERPOLATE : exact-integer?  
GL\_SUBTRACT : exact-integer?  
GL\_CONSTANT : exact-integer?  
GL\_PRIMARY\_COLOR : exact-integer?  
GL\_PREVIOUS : exact-integer?  
GL\_DOT3\_RGB : exact-integer?  
GL\_DOT3\_RGBA : exact-integer?  
GL\_BLEND\_DST\_RGB : exact-integer?  
GL\_BLEND\_SRC\_RGB : exact-integer?  
GL\_BLEND\_DST\_ALPHA : exact-integer?  
GL\_BLEND\_SRC\_ALPHA : exact-integer?  
GL\_POINT\_SIZE\_MIN : exact-integer?  
GL\_POINT\_SIZE\_MAX : exact-integer?

GL\_POINT\_FADE\_THRESHOLD\_SIZE : exact-integer?  
GL\_POINT\_DISTANCE\_ATTENUATION : exact-integer?  
GL\_GENERATE\_MIPMAP : exact-integer?  
GL\_GENERATE\_MIPMAP\_HINT : exact-integer?  
GL\_DEPTH\_COMPONENT16 : exact-integer?  
GL\_DEPTH\_COMPONENT24 : exact-integer?  
GL\_DEPTH\_COMPONENT32 : exact-integer?  
GL\_MIRRORED\_REPEAT : exact-integer?  
GL\_FOG\_COORDINATE\_SOURCE : exact-integer?  
GL\_FOG\_COORDINATE : exact-integer?  
GL\_FRAGMENT\_DEPTH : exact-integer?  
GL\_CURRENT\_FOG\_COORDINATE : exact-integer?  
GL\_FOG\_COORDINATE\_ARRAY\_TYPE : exact-integer?  
GL\_FOG\_COORDINATE\_ARRAY\_STRIDE : exact-integer?  
GL\_FOG\_COORDINATE\_ARRAY\_POINTER : exact-integer?  
GL\_FOG\_COORDINATE\_ARRAY : exact-integer?  
GL\_COLOR\_SUM : exact-integer?  
GL\_CURRENT\_SECONDARY\_COLOR : exact-integer?  
GL\_SECONDARY\_COLOR\_ARRAY\_SIZE : exact-integer?  
GL\_SECONDARY\_COLOR\_ARRAY\_TYPE : exact-integer?  
GL\_SECONDARY\_COLOR\_ARRAY\_STRIDE : exact-integer?  
GL\_SECONDARY\_COLOR\_ARRAY\_POINTER : exact-integer?  
GL\_SECONDARY\_COLOR\_ARRAY : exact-integer?  
GL\_MAX\_TEXTURE\_LOD\_BIAS : exact-integer?  
GL\_TEXTURE\_FILTER\_CONTROL : exact-integer?  
GL\_TEXTURE\_LOD\_BIAS : exact-integer?  
GL\_INCR\_WRAP : exact-integer?  
GL DECR\_WRAP : exact-integer?  
GL\_TEXTURE\_DEPTH\_SIZE : exact-integer?  
GL\_DEPTH\_TEXTURE\_MODE : exact-integer?  
GL\_TEXTURE\_COMPARE\_MODE : exact-integer?  
GL\_TEXTURE\_COMPARE\_FUNC : exact-integer?  
GL\_COMPARE\_R\_TO\_TEXTURE : exact-integer?  
GL\_BUFFER\_SIZE : exact-integer?  
GL\_BUFFER\_USAGE : exact-integer?  
GL\_QUERY\_COUNTER\_BITS : exact-integer?  
GL\_CURRENT\_QUERY : exact-integer?  
GL\_QUERY\_RESULT : exact-integer?  
GL\_QUERY\_RESULT\_AVAILABLE : exact-integer?  
GL\_ARRAY\_BUFFER : exact-integer?  
GL\_ELEMENT\_ARRAY\_BUFFER : exact-integer?  
GL\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_ELEMENT\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_VERTEX\_ARRAY\_BUFFER\_BINDING : exact-integer?

GL\_NORMAL\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_COLOR\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_INDEX\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_TEXTURE\_COORD\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_EDGE\_FLAG\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_SECONDARY\_COLOR\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_FOG\_COORDINATE\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_WEIGHT\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_VERTEX\_ATTRIB\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_READ\_ONLY : exact-integer?  
GL\_WRITE\_ONLY : exact-integer?  
GL\_READ\_WRITE : exact-integer?  
GL\_BUFFER\_ACCESS : exact-integer?  
GL\_BUFFER\_MAPPED : exact-integer?  
GL\_BUFFER\_MAP\_POINTER : exact-integer?  
GL\_STREAM\_DRAW : exact-integer?  
GL\_STREAM\_READ : exact-integer?  
GL\_STREAM\_COPY : exact-integer?  
GL\_STATIC\_DRAW : exact-integer?  
GL\_STATIC\_READ : exact-integer?  
GL\_STATIC\_COPY : exact-integer?  
GL\_DYNAMIC\_DRAW : exact-integer?  
GL\_DYNAMIC\_READ : exact-integer?  
GL\_DYNAMIC\_COPY : exact-integer?  
GL\_SAMPLES\_PASSED : exact-integer?  
GL\_FOG\_COORD\_SRC : exact-integer?  
GL\_FOG\_COORD : exact-integer?  
GL\_CURRENT\_FOG\_COORD : exact-integer?  
GL\_FOG\_COORD\_ARRAY\_TYPE : exact-integer?  
GL\_FOG\_COORD\_ARRAY\_STRIDE : exact-integer?  
GL\_FOG\_COORD\_ARRAY\_POINTER : exact-integer?  
GL\_FOG\_COORD\_ARRAY : exact-integer?  
GL\_FOG\_COORD\_ARRAY\_BUFFER\_BINDING : exact-integer?  
GL\_SRC0\_RGB : exact-integer?  
GL\_SRC1\_RGB : exact-integer?  
GL\_SRC2\_RGB : exact-integer?  
GL\_SRC0\_ALPHA : exact-integer?  
GL\_SRC1\_ALPHA : exact-integer?  
GL\_SRC2\_ALPHA : exact-integer?  
GLU\_FALSE : exact-integer?  
GLU\_TRUE : exact-integer?  
GLU\_VERSION : exact-integer?  
GLU\_EXTENSIONS : exact-integer?  
GLU\_INVALID\_ENUM : exact-integer?

GLU\_INVALID\_VALUE : exact-integer?  
GLU\_OUT\_OF\_MEMORY : exact-integer?  
GLU\_INVALID\_OPERATION : exact-integer?  
GLU\_OUTLINE\_POLYGON : exact-integer?  
GLU\_OUTLINE\_PATCH : exact-integer?  
GLU\_NURBS\_ERROR : exact-integer?  
GLU\_ERROR : exact-integer?  
GLU\_NURBS\_BEGIN : exact-integer?  
GLU\_NURBS\_BEGIN\_EXT : exact-integer?  
GLU\_NURBS\_VERTEX : exact-integer?  
GLU\_NURBS\_VERTEX\_EXT : exact-integer?  
GLU\_NURBS\_NORMAL : exact-integer?  
GLU\_NURBS\_NORMAL\_EXT : exact-integer?  
GLU\_NURBS\_COLOR : exact-integer?  
GLU\_NURBS\_COLOR\_EXT : exact-integer?  
GLU\_NURBS\_TEXTURE\_COORD : exact-integer?  
GLU\_NURBS\_TEX\_COORD\_EXT : exact-integer?  
GLU\_NURBS\_END : exact-integer?  
GLU\_NURBS\_END\_EXT : exact-integer?  
GLU\_NURBS\_BEGIN\_DATA : exact-integer?  
GLU\_NURBS\_BEGIN\_DATA\_EXT : exact-integer?  
GLU\_NURBS\_VERTEX\_DATA : exact-integer?  
GLU\_NURBS\_VERTEX\_DATA\_EXT : exact-integer?  
GLU\_NURBS\_NORMAL\_DATA : exact-integer?  
GLU\_NURBS\_NORMAL\_DATA\_EXT : exact-integer?  
GLU\_NURBS\_COLOR\_DATA : exact-integer?  
GLU\_NURBS\_COLOR\_DATA\_EXT : exact-integer?  
GLU\_NURBS\_TEXTURE\_COORD\_DATA : exact-integer?  
GLU\_NURBS\_TEX\_COORD\_DATA\_EXT : exact-integer?  
GLU\_NURBS\_END\_DATA : exact-integer?  
GLU\_NURBS\_END\_DATA\_EXT : exact-integer?  
GLU\_NURBS\_ERROR1 : exact-integer?  
GLU\_NURBS\_ERROR2 : exact-integer?  
GLU\_NURBS\_ERROR3 : exact-integer?  
GLU\_NURBS\_ERROR4 : exact-integer?  
GLU\_NURBS\_ERROR5 : exact-integer?  
GLU\_NURBS\_ERROR6 : exact-integer?  
GLU\_NURBS\_ERROR7 : exact-integer?  
GLU\_NURBS\_ERROR8 : exact-integer?  
GLU\_NURBS\_ERROR9 : exact-integer?  
GLU\_NURBS\_ERROR10 : exact-integer?  
GLU\_NURBS\_ERROR11 : exact-integer?  
GLU\_NURBS\_ERROR12 : exact-integer?  
GLU\_NURBS\_ERROR13 : exact-integer?

GLU\_NURBS\_ERROR14 : exact-integer?  
GLU\_NURBS\_ERROR15 : exact-integer?  
GLU\_NURBS\_ERROR16 : exact-integer?  
GLU\_NURBS\_ERROR17 : exact-integer?  
GLU\_NURBS\_ERROR18 : exact-integer?  
GLU\_NURBS\_ERROR19 : exact-integer?  
GLU\_NURBS\_ERROR20 : exact-integer?  
GLU\_NURBS\_ERROR21 : exact-integer?  
GLU\_NURBS\_ERROR22 : exact-integer?  
GLU\_NURBS\_ERROR23 : exact-integer?  
GLU\_NURBS\_ERROR24 : exact-integer?  
GLU\_NURBS\_ERROR25 : exact-integer?  
GLU\_NURBS\_ERROR26 : exact-integer?  
GLU\_NURBS\_ERROR27 : exact-integer?  
GLU\_NURBS\_ERROR28 : exact-integer?  
GLU\_NURBS\_ERROR29 : exact-integer?  
GLU\_NURBS\_ERROR30 : exact-integer?  
GLU\_NURBS\_ERROR31 : exact-integer?  
GLU\_NURBS\_ERROR32 : exact-integer?  
GLU\_NURBS\_ERROR33 : exact-integer?  
GLU\_NURBS\_ERROR34 : exact-integer?  
GLU\_NURBS\_ERROR35 : exact-integer?  
GLU\_NURBS\_ERROR36 : exact-integer?  
GLU\_NURBS\_ERROR37 : exact-integer?  
GLU\_AUTO\_LOAD\_MATRIX : exact-integer?  
GLU\_CULLING : exact-integer?  
GLU\_SAMPLING\_TOLERANCE : exact-integer?  
GLU\_DISPLAY\_MODE : exact-integer?  
GLU\_PARAMETRIC\_TOLERANCE : exact-integer?  
GLU\_SAMPLING\_METHOD : exact-integer?  
GLU\_U\_STEP : exact-integer?  
GLU\_V\_STEP : exact-integer?  
GLU\_NURBS\_MODE : exact-integer?  
GLU\_NURBS\_MODE\_EXT : exact-integer?  
GLU\_NURBS\_TESSELLATOR : exact-integer?  
GLU\_NURBS\_TESSELLATOR\_EXT : exact-integer?  
GLU\_NURBS\_RENDERER : exact-integer?  
GLU\_NURBS\_RENDERER\_EXT : exact-integer?  
GLU\_OBJECT\_PARAMETRIC\_ERROR : exact-integer?  
GLU\_OBJECT\_PARAMETRIC\_ERROR\_EXT : exact-integer?  
GLU\_OBJECT\_PATH\_LENGTH : exact-integer?  
GLU\_OBJECT\_PATH\_LENGTH\_EXT : exact-integer?  
GLU\_PATH\_LENGTH : exact-integer?  
GLU\_PARAMETRIC\_ERROR : exact-integer?

GLU\_DOMAIN\_DISTANCE : exact-integer?  
GLU\_MAP1\_TRIM\_2 : exact-integer?  
GLU\_MAP1\_TRIM\_3 : exact-integer?  
GLU\_POINT : exact-integer?  
GLU\_LINE : exact-integer?  
GLU\_FILL : exact-integer?  
GLU\_SILHOUETTE : exact-integer?  
GLU\_SMOOTH : exact-integer?  
GLU\_FLAT : exact-integer?  
GLU\_NONE : exact-integer?  
GLU\_OUTSIDE : exact-integer?  
GLU\_INSIDE : exact-integer?  
GLU\_TESS\_BEGIN : exact-integer?  
GLU\_BEGIN : exact-integer?  
GLU\_TESS\_VERTEX : exact-integer?  
GLU\_VERTEX : exact-integer?  
GLU\_TESS\_END : exact-integer?  
GLU\_END : exact-integer?  
GLU\_TESS\_ERROR : exact-integer?  
GLU\_TESS\_EDGE\_FLAG : exact-integer?  
GLU\_EDGE\_FLAG : exact-integer?  
GLU\_TESS\_COMBINE : exact-integer?  
GLU\_TESS\_BEGIN\_DATA : exact-integer?  
GLU\_TESS\_VERTEX\_DATA : exact-integer?  
GLU\_TESS\_END\_DATA : exact-integer?  
GLU\_TESS\_ERROR\_DATA : exact-integer?  
GLU\_TESS\_EDGE\_FLAG\_DATA : exact-integer?  
GLU\_TESS\_COMBINE\_DATA : exact-integer?  
GLU\_CW : exact-integer?  
GLU\_CCW : exact-integer?  
GLU\_INTERIOR : exact-integer?  
GLU\_EXTERIOR : exact-integer?  
GLU\_UNKNOWN : exact-integer?  
GLU\_TESS\_WINDING\_RULE : exact-integer?  
GLU\_TESS\_BOUNDARY\_ONLY : exact-integer?  
GLU\_TESS\_TOLERANCE : exact-integer?  
GLU\_TESS\_ERROR1 : exact-integer?  
GLU\_TESS\_ERROR2 : exact-integer?  
GLU\_TESS\_ERROR3 : exact-integer?  
GLU\_TESS\_ERROR4 : exact-integer?  
GLU\_TESS\_ERROR5 : exact-integer?  
GLU\_TESS\_ERROR6 : exact-integer?  
GLU\_TESS\_ERROR7 : exact-integer?  
GLU\_TESS\_ERROR8 : exact-integer?

```
GLU_TESS_MISSING_BEGIN_POLYGON : exact-integer?
GLU_TESS_MISSING_BEGIN_CONTOUR : exact-integer?
GLU_TESS_MISSING_END_POLYGON : exact-integer?
GLU_TESS_MISSING_END_CONTOUR : exact-integer?
GLU_TESS_COORD_TOO_LARGE : exact-integer?
GLU_TESS_NEED_COMBINE_CALLBACK : exact-integer?
GLU_TESS_WINDING_ODD : exact-integer?
GLU_TESS_WINDING_NONZERO : exact-integer?
GLU_TESS_WINDING_POSITIVE : exact-integer?
GLU_TESS_WINDING_NEGATIVE : exact-integer?
GLU_TESS_WINDING_ABS_GEQ_TWO : exact-integer?
GLU_TESS_MAX_COORD : real?
```

All OpenGL-defined constants.

```
(feedback-buffer->gl-float-vector buf) → gl-float-vector?
  buf : feedback-buffer-object?
```

Converts a result from `glFeedbackBuffer` to a vector.

```
(select-buffer->gl-uint-vector buf) → gl-uint-vector?
  buf : select-buffer-object?
```

Converts a result from `glSelectBuffer` to a vector.

### 3 Racket-Style OpenGL

```
(require sgl)      package: sgl
```

The functions in `sgl` use Racket style names instead of C style names. To convert a C OpenGL name to a Racket OpenGL name, change the `gl` prefix to `gl-`, separate adjacent words with hyphens, and convert to all lower case. Functions that have several variants to accommodate different numbers and types of arguments are collapsed into one or two functions in `sgl`. For example, `sgl` provides two vertex functions: `vertex` and `vertex-v`. The `vertex` function accepts 2, 3 or 4 numerical arguments, and the `vertex-v` function accepts `gl-vectors` of length 2, 3 or 4. The C language OpenGL interface, in contrast, has 24 vertex functions: `glVertex3i`, `glVertex4fv`, etc.

Functions in `sgl` take symbols instead of integers for `GLenum` arguments. Each function checks that the given symbol is an acceptable argument and raises an exception if it is not. Given the name of a C-language `#define` constant, determine the corresponding symbolic argument by removing the leading `GL_`, converting the letters to lower-case and replacing each `_` with `-`. For example, `GL_TRIANGLES` becomes `'triangles`, and `GL_TRIANGLE_STRIP` becomes `'triangle-strip`. Additionally, the functions check the length of any array arguments to ensure that OpenGL does not attempt to write or read after the array.

The `sgl` module is not as complete as the `sgl/gl` module.

Examples:

```
(require sgl sgl/gl-vectors)
(gl-begin 'triangles)
(gl-vertex 1 2 3)
(gl-vertex-v (gl-float-vector 1 2 3 4))
(gl-end)
```

```
(struct gl-selection-record (min-z max-z stack)
  #:extra-constructor-name make-gl-selection-record)
min-z : real?
max-z : real?
stack : ....
```

Represents a selection.

```
gl-accum : procedure?
gl-active-texture : procedure?
gl-alpha-func : procedure?
gl-begin : procedure?
gl-begin-query : procedure?
```

gl-blend-color : procedure?  
gl-blend-equation : procedure?  
gl-blend-func : procedure?  
gl-blend-func-separate : procedure?  
gl-call-list : procedure?  
gl-check-extension : procedure?  
gl-clear : procedure?  
gl-clear-accum : procedure?  
gl-clear-color : procedure?  
gl-clear-depth : procedure?  
gl-clear-index : procedure?  
gl-clear-stencil : procedure?  
gl-clip-plane : procedure?  
gl-color : procedure?  
gl-color-mask : procedure?  
gl-color-material : procedure?  
gl-color-v : procedure?  
gl-copy-pixels : procedure?  
gl-cull-face : procedure?  
gl-cylinder : procedure?  
gl-delete-lists : procedure?  
gl-delete-queries : procedure?  
gl-depth-func : procedure?  
gl-depth-mask : procedure?  
gl-depth-range : procedure?  
gl-disable : procedure?  
gl-disk : procedure?  
gl-edge-flag : procedure?  
gl-enable : procedure?  
gl-end : procedure?  
gl-end-list : procedure?  
gl-end-query : procedure?  
gl-eval-coord : procedure?  
gl-eval-coord-v : procedure?  
gl-eval-mesh : procedure?  
gl-eval-point : procedure?  
gl-feedback-buffer->gl-float-vector : procedure?  
gl-finish : procedure?  
gl-flush : procedure?  
gl-front-face : procedure?  
gl-frustum : procedure?  
gl-gen-lists : procedure?  
gl-gen-queries : procedure?  
gl-get-error : procedure?

```
gl-get-string : procedure?  
gl-hint : procedure?  
gl-index : procedure?  
gl-index-mask : procedure?  
gl-index-v : procedure?  
gl-init-names : procedure?  
gl-is-buffer : procedure?  
gl-is-enabled : procedure?  
gl-is-list : procedure?  
gl-is-query : procedure?  
gl-light : procedure?  
gl-light-model : procedure?  
gl-light-model-v : procedure?  
gl-light-v : procedure?  
gl-line-stipple : procedure?  
gl-line-width : procedure?  
gl-list-base : procedure?  
gl-load-identity : procedure?  
gl-load-matrix : procedure?  
gl-load-name : procedure?  
gl-load-transpose-matrix : procedure?  
gl-look-at : procedure?  
gl-map-grid : procedure?  
gl-material : procedure?  
gl-material-v : procedure?  
gl-matrix-mode : procedure?  
gl-mult-matrix : procedure?  
gl-mult-transpose-matrix : procedure?  
gl-multi-tex-coord : procedure?  
gl-multi-tex-coord-v : procedure?  
gl-new-list : procedure?  
gl-new-quadric : procedure?  
gl-normal : procedure?  
gl-normal-v : procedure?  
gl-ortho : procedure?  
gl-ortho-2d : procedure?  
gl-partial-disk : procedure?  
gl-pass-through : procedure?  
gl-perspective : procedure?  
gl-pick-matrix : procedure?  
gl-pixel-store : procedure?  
gl-point-parameter : procedure?  
gl-point-parameter-v : procedure?  
gl-point-size : procedure?
```

```
gl-polygon-mode : procedure?  
gl-polygon-offset : procedure?  
gl-pop-attrib : procedure?  
gl-pop-client-attrib : procedure?  
gl-pop-matrix : procedure?  
gl-pop-name : procedure?  
gl-project : procedure?  
gl-push-matrix : procedure?  
gl-push-name : procedure?  
gl-quadric-draw-style : procedure?  
gl-quadric-normals : procedure?  
gl-quadric-orientation : procedure?  
gl-quadric-texture : procedure?  
gl-raster-pos : procedure?  
gl-raster-pos-v : procedure?  
gl-rect : procedure?  
gl-rect-v : procedure?  
gl-render-mode : procedure?  
gl-rotate : procedure?  
gl-sample-coverage : procedure?  
gl-scale : procedure?  
gl-scissor : procedure?  
gl-secondary-color : procedure?  
gl-secondary-color-v : procedure?  
gl-select-buffer->gl-uint-vector : procedure?  
gl-shade-model : procedure?  
gl-sphere : procedure?  
gl-stencil-func : procedure?  
gl-stencil-mask : procedure?  
gl-stencil-op : procedure?  
gl-tex-coord : procedure?  
gl-tex-coord-v : procedure?  
gl-tex-gen : procedure?  
gl-tex-gen-v : procedure?  
gl-translate : procedure?  
gl-u-get-string : procedure?  
gl-un-project : procedure?  
gl-un-project4 : procedure?  
gl-vertex : procedure?  
gl-vertex-v : procedure?  
gl-viewport : procedure?  
gl-window-pos : procedure?  
gl-window-pos-v : procedure?
```

Racket-style variants of the OpenGL functions.

```
(gl-process-selection vec hits) → (listof gl-selection-record?)  
  vec : gl-uint-vector?  
  hits : exact-nonnegative-integer?
```

Parses the contents of `vec` from the format used by `glSelectBuffer`. The second argument should be the number of hits as returned by `glRenderMode`.

```
(gl-get-gl-version-number) → exact-nonnegative-integer?
```

Returns the run-time OpenGL version number as an integer: 10, 11, 12, 13, 14, 15, or 20.

```
(gl-get-glu-version-number) → exact-nonnegative-integer?
```

Returns the run-time GLU version number as an integer: 10, 11, 12, or 13.

## 4 OpenGL Vectors

```
(require sgl/gl-vectors)      package: sgl
```

The `sgl/gl-vectors` module supports OpenGL programming with `cvector`s. In this document and in the error messages, a “gl-vector” is just a `cvector`, while a “gl-*<type>*-vector” is a `cvector` with an appropriate type. Use the `sgl/gl-vectors` module vectors instead of a Racket `cvector` directly, because they are specialized to handle the OpenGL types correctly.

```
(gl-vector? v) → boolean?
  v : any/c
(gl-vector->vector vec) → vector?
  vec : cvector?
(gl-vector->list vec) → list?
  vec : cvector?
(gl-vector-length vec) → exact-nonnegative-integer?
  vec : cvector?
(gl-vector-ref vec pos) → any/v
  vec : cvector?
  pos : exact-nonnegative-integer?
(gl-vector-set! vec pos v) → void?
  vec : cvector?
  pos : exact-nonnegative-integer?
  v : any/v
```

Synonyms for `cvector?`, `cvector->vector`, `cvector-length`, etc.

```
(gl-byte-vector? v) → boolean?
  v : any/c
(make-gl-byte-vector pos) → gl-byte-vector?
  pos : exact-nonnegative-integer?
(gl-byte-vector v ...) → gl-byte-vector?
  v : byte?
(vector->gl-byte-vector v ...) → gl-byte-vector?
  v : (vectorof byte?)
(list->gl-byte-vector v ...) → gl-byte-vector?
  v : (listof byte?)
(gl-byte-vector+ vec ...+) → gl-byte-vector?
  vec : gl-byte-vector?
(gl-byte-vector- vec ...+) → gl-byte-vector?
  vec : gl-byte-vector?
(gl-byte-vector* x vec) → gl-byte-vector?
  x : real?
  vec : gl-byte-vector?
```

Operations on vectors of `byte` elements. The `gl-byte-vector+` and `gl-byte-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-byte-vector*` function multiplies each element of `vec` by `x`.

```
(gl-byte-vector? v) → boolean?
  v : any/c
(make-gl-byte-vector pos) → gl-byte-vector?
  pos : exact-nonnegative-integer?
(gl-byte-vector v ...) → gl-byte-vector?
  v : ubyte?
(vector->gl-byte-vector v ...) → gl-byte-vector?
  v : (vectorof ubyte?)
(list->gl-byte-vector v ...) → gl-byte-vector?
  v : (listof ubyte?)
(gl-byte-vector+ vec ...+) → gl-byte-vector?
  vec : gl-byte-vector?
(gl-byte-vector- vec ...+) → gl-byte-vector?
  vec : gl-byte-vector?
(gl-byte-vector* x vec) → gl-byte-vector?
  x : real?
  vec : gl-byte-vector?
```

Operations on vectors of `ubyte` elements. The `gl-ubyte-vector+` and `gl-ubyte-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-ubyte-vector*` function multiplies each element of `vec` by `x`.

```
(gl-short-vector? v) → boolean?
  v : any/c
(make-gl-short-vector pos) → gl-short-vector?
  pos : exact-nonnegative-integer?
(gl-short-vector v ...) → gl-short-vector?
  v : short?
(vector->gl-short-vector v ...) → gl-short-vector?
  v : (vectorof short?)
(list->gl-short-vector v ...) → gl-short-vector?
  v : (listof short?)
(gl-short-vector+ vec ...+) → gl-short-vector?
  vec : gl-short-vector?
(gl-short-vector- vec ...+) → gl-short-vector?
  vec : gl-short-vector?
(gl-short-vector* x vec) → gl-short-vector?
  x : real?
  vec : gl-short-vector?
```

Operations on vectors of `short` elements. The `gl-short-vector+` and `gl-short-`

`vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-short-vector*` function multiplies each element of `vec` by `x`.

```
(gl-ushort-vector? v) → boolean?
  v : any/c
(make-gl-ushort-vector pos) → gl-ushort-vector?
  pos : exact-nonnegative-integer?
(gl-ushort-vector v ...) → gl-ushort-vector?
  v : ushort?
(vector->gl-ushort-vector v ...) → gl-ushort-vector?
  v : (vectorof ushort?)
(list->gl-ushort-vector v ...) → gl-ushort-vector?
  v : (listof ushort?)
(gl-ushort-vector+ vec ...+) → gl-ushort-vector?
  vec : gl-ushort-vector?
(gl-ushort-vector- vec ...+) → gl-ushort-vector?
  vec : gl-ushort-vector?
(gl-ushort-vector* x vec) → gl-ushort-vector?
  x : real?
  vec : gl-ushort-vector?
```

Operations on vectors of `ushort` elements. The `gl-ushort-vector+` and `gl-ushort-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-ushort-vector*` function multiplies each element of `vec` by `x`.

```
(gl-int-vector? v) → boolean?
  v : any/c
(make-gl-int-vector pos) → gl-int-vector?
  pos : exact-nonnegative-integer?
(gl-int-vector v ...) → gl-int-vector?
  v : int?
(vector->gl-int-vector v ...) → gl-int-vector?
  v : (vectorof int?)
(list->gl-int-vector v ...) → gl-int-vector?
  v : (listof int?)
(gl-int-vector+ vec ...+) → gl-int-vector?
  vec : gl-int-vector?
(gl-int-vector- vec ...+) → gl-int-vector?
  vec : gl-int-vector?
(gl-int-vector* x vec) → gl-int-vector?
  x : real?
  vec : gl-int-vector?
```

Operations on vectors of `int` elements. The `gl-int-vector+` and `gl-int-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively.

The `gl-int-vector*` function multiplies each element of `vec` by `x`.

```
(gl-uint-vector? v) → boolean?
  v : any/c
(make-gl-uint-vector pos) → gl-uint-vector?
  pos : exact-nonnegative-integer?
(gl-uint-vector v ...) → gl-uint-vector?
  v : uint?
(vector->gl-uint-vector v ...) → gl-uint-vector?
  v : (vectorof uint?)
(list->gl-uint-vector v ...) → gl-uint-vector?
  v : (listof uint?)
(gl-uint-vector+ vec ...+) → gl-uint-vector?
  vec : gl-uint-vector?
(gl-uint-vector- vec ...+) → gl-uint-vector?
  vec : gl-uint-vector?
(gl-uint-vector* x vec) → gl-uint-vector?
  x : real?
  vec : gl-uint-vector?
```

Operations on vectors of `uint` elements. The `gl-uint-vector+` and `gl-uint-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-uint-vector*` function multiplies each element of `vec` by `x`.

```
(gl-float-vector? v) → boolean?
  v : any/c
(make-gl-float-vector pos) → gl-float-vector?
  pos : exact-nonnegative-integer?
(gl-float-vector v ...) → gl-float-vector?
  v : float?
(vector->gl-float-vector v ...) → gl-float-vector?
  v : (vectorof float?)
(list->gl-float-vector v ...) → gl-float-vector?
  v : (listof float?)
(gl-float-vector+ vec ...+) → gl-float-vector?
  vec : gl-float-vector?
(gl-float-vector- vec ...+) → gl-float-vector?
  vec : gl-float-vector?
(gl-float-vector* x vec) → gl-float-vector?
  x : real?
  vec : gl-float-vector?
```

Operations on vectors of `float` elements. The `gl-float-vector+` and `gl-float-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-float-vector*` function multiplies each element of `vec` by `x`.

```

(gl-double-vector? v) → boolean?
  v : any/c
(make-gl-double-vector pos) → gl-double-vector?
  pos : exact-nonnegative-integer?
(gl-double-vector v ...) → gl-double-vector?
  v : double?
(vector->gl-double-vector v ...) → gl-double-vector?
  v : (vectorof double?)
(list->gl-double-vector v ...) → gl-double-vector?
  v : (listof double?)
(gl-double-vector+ vec ...+) → gl-double-vector?
  vec : gl-double-vector?
(gl-double-vector- vec ...+) → gl-double-vector?
  vec : gl-double-vector?
(gl-double-vector* x vec) → gl-double-vector?
  x : real?
  vec : gl-double-vector?

```

Operations on vectors of double elements. The `gl-double-vector+` and `gl-double-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-double-vector*` function multiplies each element of `vec` by `x`.

```

(gl-boolean-vector? v) → boolean?
  v : any/c
(make-gl-boolean-vector pos) → gl-boolean-vector?
  pos : exact-nonnegative-integer?
(gl-boolean-vector v ...) → gl-boolean-vector?
  v : boolean?
(vector->gl-boolean-vector v ...) → gl-boolean-vector?
  v : (vectorof boolean?)
(list->gl-boolean-vector v ...) → gl-boolean-vector?
  v : (listof boolean?)
(gl-boolean-vector+ vec ...+) → gl-boolean-vector?
  vec : gl-boolean-vector?
(gl-boolean-vector- vec ...+) → gl-boolean-vector?
  vec : gl-boolean-vector?
(gl-boolean-vector* x vec) → gl-boolean-vector?
  x : real?
  vec : gl-boolean-vector?

```

Operations on vectors of boolean elements. The `gl-boolean-vector+` and `gl-boolean-vector-` functions compute the element-by-element sum and difference of the given vectors, respectively. The `gl-boolean-vector*` function multiplies each element of `vec` by `x`.

```
(gl-vector-norm vec) → real?  
vec : gl-vector?
```

Returns the square root of the sum of the squares of the elements of *vec*.

## 5 Bitmaps

```
(require sgl/bitmap)      package: sgl

(bitmap->gl-list bitmap
  [#:with-gl with-gl-proc
   #:mask mask])          → exact-integer?

bitmap : (is-a?/c bitmap%)
with-gl-proc : ((-> any) . -> . any) = (lambda (f) (f))
mask : (or/c (is-a?/c bitmap%) false/c)
      = (send bitmap get-loaded-mask)
```

Converts the given bitmap into an OpenGL list that can be rendered with `gl-call-list` or `glCallList`. The rendered object is a square on the  $z=0$  plane with corners at (0,0) and (1,1).

The `with-gl-proc` must accept a thunk and call it while the relevant OpenGL context is selected. Otherwise, the relevant OpenGL context must be selected already.

If `mask` is not `#f`, it is used as the mask bitmap for extracting alpha values.

## 6 Initialization

```
(require sgl/init)      package: sgl
```

Requiring the `sgl/init` library initializes platform-specific OpenGL state to help avoid crashes when OpenGL commands are incorrectly used without a current context. This library is required by `sgl` and `sgl/gl`, so it normally does not need to be required explicitly.

On Mac OS X, `sgl/init` checks whether any GL context is current, and if not, it creates a dummy context and sets it as the current context.

## Index

bitmap->gl-list, 51  
Bitmaps, 51  
C-Style OpenGL, 4  
feedback-buffer->gl-float-vector, 39  
GFclampf, 4  
GFfloat, 4  
gl-accum, 40  
gl-active-texture, 40  
gl-alpha-func, 40  
gl-begin, 40  
gl-begin-query, 40  
gl-blend-color, 41  
gl-blend-equation, 41  
gl-blend-func, 41  
gl-blend-func-separate, 41  
gl-boolean-vector, 49  
gl-boolean-vector\*, 49  
gl-boolean-vector+, 49  
gl-boolean-vector-, 49  
gl-boolean-vector?, 49  
gl-byte-vector, 45  
gl-byte-vector\*, 45  
gl-byte-vector+, 45  
gl-byte-vector-, 45  
gl-byte-vector?, 45  
gl-call-list, 41  
gl-check-extension, 41  
gl-clear, 41  
gl-clear-accum, 41  
gl-clear-color, 41  
gl-clear-depth, 41  
gl-clear-index, 41  
gl-clear-stencil, 41  
gl-clip-plane, 41  
gl-color, 41  
gl-color-mask, 41  
gl-color-material, 41  
gl-color-v, 41  
gl-copy-pixels, 41  
gl-cull-face, 41  
gl-cylinder, 41  
gl-delete-lists, 41  
gl-delete-queries, 41  
gl-depth-func, 41  
gl-depth-mask, 41  
gl-depth-range, 41  
gl-disable, 41  
gl-disk, 41  
gl-double-vector, 49  
gl-double-vector\*, 49  
gl-double-vector+, 49  
gl-double-vector-, 49  
gl-double-vector?, 49  
gl-edge-flag, 41  
gl-enable, 41  
gl-end, 41  
gl-end-list, 41  
gl-end-query, 41  
gl-eval-coord, 41  
gl-eval-coord-v, 41  
gl-eval-mesh, 41  
gl-eval-point, 41  
gl-feedback-buffer->gl-float-vector, 41  
gl-finish, 41  
gl-float-vector, 48  
gl-float-vector\*, 48  
gl-float-vector+, 48  
gl-float-vector-, 48  
gl-float-vector?, 48  
gl-flush, 41  
gl-front-face, 41  
gl-frustum, 41  
gl-gen-lists, 41  
gl-gen-queries, 41  
gl-get-error, 41  
gl-get-gl-version-number, 44  
gl-get-glu-version-number, 44  
gl-get-string, 42  
gl-hint, 42  
gl-index, 42

- `gl-index-mask`, 42
- `gl-index-v`, 42
- `gl-init-names`, 42
- `gl-int-vector`, 47
- `gl-int-vector*`, 47
- `gl-int-vector+`, 47
- `gl-int-vector-`, 47
- `gl-int-vector?`, 47
- `gl-is-buffer`, 42
- `gl-is-enabled`, 42
- `gl-is-list`, 42
- `gl-is-query`, 42
- `gl-light`, 42
- `gl-light-model`, 42
- `gl-light-model-v`, 42
- `gl-light-v`, 42
- `gl-line-stipple`, 42
- `gl-line-width`, 42
- `gl-list-base`, 42
- `gl-load-identity`, 42
- `gl-load-matrix`, 42
- `gl-load-name`, 42
- `gl-load-transpose-matrix`, 42
- `gl-look-at`, 42
- `gl-map-grid`, 42
- `gl-material`, 42
- `gl-material-v`, 42
- `gl-matrix-mode`, 42
- `gl-mult-matrix`, 42
- `gl-mult-transpose-matrix`, 42
- `gl-multi-tex-coord`, 42
- `gl-multi-tex-coord-v`, 42
- `gl-new-list`, 42
- `gl-new-quadric`, 42
- `gl-normal`, 42
- `gl-normal-v`, 42
- `gl-ortho`, 42
- `gl-ortho-2d`, 42
- `gl-partial-disk`, 42
- `gl-pass-through`, 42
- `gl-perspective`, 42
- `gl-pick-matrix`, 42
- `gl-pixel-store`, 42
- `gl-point-parameter`, 42
- `gl-point-parameter-v`, 42
- `gl-point-size`, 42
- `gl-polygon-mode`, 43
- `gl-polygon-offset`, 43
- `gl-pop-attrib`, 43
- `gl-pop-client-attrib`, 43
- `gl-pop-matrix`, 43
- `gl-pop-name`, 43
- `gl-process-selection`, 44
- `gl-project`, 43
- `gl-push-matrix`, 43
- `gl-push-name`, 43
- `gl-quadric-draw-style`, 43
- `gl-quadric-normals`, 43
- `gl-quadric-orientation`, 43
- `gl-quadric-texture`, 43
- `gl-raster-pos`, 43
- `gl-raster-pos-v`, 43
- `gl-rect`, 43
- `gl-rect-v`, 43
- `gl-render-mode`, 43
- `gl-rotate`, 43
- `gl-sample-coverage`, 43
- `gl-scale`, 43
- `gl-scissor`, 43
- `gl-secondary-color`, 43
- `gl-secondary-color-v`, 43
- `gl-select-buffer->gl-uint-vector`, 43
- `gl-selection-record` (struct), 40
- `gl-selection-record-max-z`, 40
- `gl-selection-record-min-z`, 40
- `gl-selection-record-stack`, 40
- `gl-selection-record?`, 40
- `gl-shade-model`, 43
- `gl-short-vector`, 46
- `gl-short-vector*`, 46
- `gl-short-vector+`, 46
- `gl-short-vector-`, 46
- `gl-short-vector?`, 46

[gl-sphere](#), 43  
[gl-stencil-func](#), 43  
[gl-stencil-mask](#), 43  
[gl-stencil-op](#), 43  
[gl-tex-coord](#), 43  
[gl-tex-coord-v](#), 43  
[gl-tex-gen](#), 43  
[gl-tex-gen-v](#), 43  
[gl-translate](#), 43  
[gl-u-get-string](#), 43  
[gl-ubyte-vector](#), 46  
[gl-ubyte-vector\\*](#), 46  
[gl-ubyte-vector+](#), 46  
[gl-ubyte-vector-](#), 46  
[gl-ubyte-vector?](#), 46  
[gl-uint-vector](#), 48  
[gl-uint-vector\\*](#), 48  
[gl-uint-vector+](#), 48  
[gl-uint-vector-](#), 48  
[gl-uint-vector?](#), 48  
[gl-un-project](#), 43  
[gl-un-project4](#), 43  
[gl-ushort-vector](#), 47  
[gl-ushort-vector\\*](#), 47  
[gl-ushort-vector+](#), 47  
[gl-ushort-vector-](#), 47  
[gl-ushort-vector?](#), 47  
[gl-vector->list](#), 45  
[gl-vector->vector](#), 45  
[gl-vector-length](#), 45  
[gl-vector-norm](#), 50  
[gl-vector-ref](#), 45  
[gl-vector-set!](#), 45  
[gl-vector?](#), 45  
[gl-vertex](#), 43  
[gl-vertex-v](#), 43  
[gl-viewport](#), 43  
[gl-window-pos](#), 43  
[gl-window-pos-v](#), 43  
[GL: 3-D Graphics](#), 1  
[GL\\_2\\_BYTES](#), 17  
[GL\\_2D](#), 21  
[GL\\_3\\_BYTES](#), 17  
[GL\\_3D](#), 21  
[GL\\_3D\\_COLOR](#), 21  
[GL\\_3D\\_COLOR\\_TEXTURE](#), 21  
[GL\\_4\\_BYTES](#), 17  
[GL\\_4D\\_COLOR\\_TEXTURE](#), 21  
[GL\\_ACCUM](#), 20  
[GL\\_ACCUM\\_ALPHA\\_BITS](#), 20  
[GL\\_ACCUM\\_BLUE\\_BITS](#), 20  
[GL\\_ACCUM\\_BUFFER\\_BIT](#), 27  
[GL\\_ACCUM\\_CLEAR\\_VALUE](#), 20  
[GL\\_ACCUM\\_GREEN\\_BITS](#), 20  
[GL\\_ACCUM\\_RED\\_BITS](#), 20  
[GL\\_ACTIVE\\_TEXTURE](#), 32  
[GL\\_ADD](#), 20  
[GL\\_ADD\\_SIGNED](#), 33  
[GL\\_ALIASED\\_LINE\\_WIDTH\\_RANGE](#), 29  
[GL\\_ALIASED\\_POINT\\_SIZE\\_RANGE](#), 29  
[GL\\_ALL\\_ATTRIB\\_BITS](#), 28  
[GL\\_ALL\\_CLIENT\\_ATTRIB\\_BITS](#), 29  
[GL\\_ALPHA](#), 23  
[GL\\_ALPHA12](#), 28  
[GL\\_ALPHA16](#), 28  
[GL\\_ALPHA4](#), 28  
[GL\\_ALPHA8](#), 28  
[GL\\_ALPHA\\_BIAS](#), 25  
[GL\\_ALPHA\\_BITS](#), 23  
[GL\\_ALPHA\\_SCALE](#), 25  
[GL\\_ALPHA\\_TEST](#), 20  
[GL\\_ALPHA\\_TEST\\_FUNC](#), 20  
[GL\\_ALPHA\\_TEST\\_REF](#), 20  
[GL\\_ALWAYS](#), 19  
[GL\\_AMBIENT](#), 20  
[GL\\_AMBIENT\\_AND\\_DIFFUSE](#), 20  
[GL\\_AND](#), 22  
[GL\\_AND\\_INVERTED](#), 22  
[GL\\_AND\\_REVERSE](#), 22  
[GL\\_ARRAY\\_BUFFER](#), 34  
[GL\\_ARRAY\\_BUFFER\\_BINDING](#), 34  
[GL\\_ATTRIB\\_STACK\\_DEPTH](#), 23  
[GL\\_AUTO\\_NORMAL](#), 24  
[GL\\_AUX0](#), 22

|                                  |                                   |
|----------------------------------|-----------------------------------|
| GL_AUX1, 22                      | GL_CLIENT_PIXEL_STORE_BIT, 28     |
| GL_AUX2, 22                      | GL_CLIENT_VERTEX_ARRAY_BIT, 28    |
| GL_AUX3, 22                      | GL_CLIP_PLANE0, 20                |
| GL_AUX_BUFFERS, 23               | GL_CLIP_PLANE1, 20                |
| GL_BACK, 18                      | GL_CLIP_PLANE2, 20                |
| GL_BACK_LEFT, 22                 | GL_CLIP_PLANE3, 20                |
| GL_BACK_RIGHT, 22                | GL_CLIP_PLANE4, 20                |
| GL_BGR, 29                       | GL_CLIP_PLANE5, 20                |
| GL_BGRA, 29                      | GL_COEFF, 24                      |
| GL_BITMAP, 23                    | GL_COLOR, 23                      |
| GL_BITMAP_TOKEN, 21              | GL_COLOR_ARRAY, 17                |
| GL_BLEND, 20                     | GL_COLOR_ARRAY_BUFFER_BINDING, 35 |
| GL_BLEND_COLOR, 30               | GL_COLOR_ARRAY_POINTER, 18        |
| GL_BLEND_DST, 20                 | GL_COLOR_ARRAY_SIZE, 17           |
| GL_BLEND_DST_ALPHA, 33           | GL_COLOR_ARRAY_STRIDE, 17         |
| GL_BLEND_DST_RGB, 33             | GL_COLOR_ARRAY_TYPE, 17           |
| GL_BLEND_EQUATION, 30            | GL_COLOR_BUFFER_BIT, 27           |
| GL_BLEND_SRC, 20                 | GL_COLOR_CLEAR_VALUE, 23          |
| GL_BLEND_SRC_ALPHA, 33           | GL_COLOR_INDEX, 22                |
| GL_BLEND_SRC_RGB, 33             | GL_COLOR_INDEXES, 20              |
| GL_BLUE, 23                      | GL_COLOR_LOGIC_OP, 21             |
| GL_BLUE_BIAS, 25                 | GL_COLOR_MATERIAL, 20             |
| GL_BLUE_BITS, 23                 | GL_COLOR_MATERIAL_FACE, 20        |
| GL_BLUE_SCALE, 25                | GL_COLOR_MATERIAL_PARAMETER, 20   |
| GL_BUFFER_ACCESS, 35             | GL_COLOR_MATRIX, 31               |
| GL_BUFFER_MAP_POINTER, 35        | GL_COLOR_MATRIX_STACK_DEPTH, 31   |
| GL_BUFFER_MAPPED, 35             | GL_COLOR_SUM, 34                  |
| GL_BUFFER_SIZE, 34               | GL_COLOR_TABLE, 31                |
| GL_BUFFER_USAGE, 34              | GL_COLOR_TABLE_ALPHA_SIZE, 31     |
| GL_BYTE, 17                      | GL_COLOR_TABLE_BIAS, 31           |
| GL_C3F_V3F, 18                   | GL_COLOR_TABLE_BLUE_SIZE, 31      |
| GL_C4F_N3F_V3F, 18               | GL_COLOR_TABLE_FORMAT, 31         |
| GL_C4UB_V2F, 18                  | GL_COLOR_TABLE_GREEN_SIZE, 31     |
| GL_C4UB_V3F, 18                  | GL_COLOR_TABLE_INTENSITY_SIZE, 31 |
| GL_CCW, 18                       | GL_COLOR_TABLE_LUMINANCE_SIZE, 31 |
| GL_CLAMP, 27                     | GL_COLOR_TABLE_RED_SIZE, 31       |
| GL_CLAMP_TO_BORDER, 33           | GL_COLOR_TABLE_SCALE, 31          |
| GL_CLAMP_TO_EDGE, 29             | GL_COLOR_TABLE_WIDTH, 31          |
| GL_CLEAR, 22                     | GL_COLOR_WRITEMASK, 23            |
| GL_CLIENT_ACTIVE_TEXTURE, 32     | GL_COMBINE, 33                    |
| GL_CLIENT_ALL_ATTRIB_BITS, 29    | GL_COMBINE_ALPHA, 33              |
| GL_CLIENT_ATTRIB_STACK_DEPTH, 23 | GL_COMBINE_RGB, 33                |

|                                   |                                    |
|-----------------------------------|------------------------------------|
| GL_COMPARE_R_TO_TEXTURE, 34       | GL_CURRENT_RASTER_TEXTURE_COORDS,  |
| GL_COMPILE, 19                    | 24                                 |
| GL_COMPILE_AND_EXECUTE, 19        | GL_CURRENT_SECONDARY_COLOR, 34     |
| GL_COMPRESSED_ALPHA, 33           | GL_CURRENT_TEXTURE_COORDS, 24      |
| GL_COMPRESSED_INTENSITY, 33       | GL_CW, 18                          |
| GL_COMPRESSED_LUMINANCE, 33       | GL_DECAL, 27                       |
| GL_COMPRESSED_LUMINANCE_ALPHA, 33 | GL_DECR, 22                        |
| GL_COMPRESSED_RGB, 33             | GL_DECR_WRAP, 34                   |
| GL_COMPRESSED_RGBA, 33            | GL_DEPTH, 23                       |
| GL_COMPRESSED_TEXTURE_FORMATS, 33 | GL_DEPTH_BIAS, 25                  |
| GL_CONSTANT, 33                   | GL_DEPTH_BITS, 19                  |
| GL_CONSTANT_ALPHA, 30             | GL_DEPTH_BUFFER_BIT, 27            |
| GL_CONSTANT_ATTENUATION, 19       | GL_DEPTH_CLEAR_VALUE, 19           |
| GL_CONSTANT_BORDER, 31            | GL_DEPTH_COMPONENT, 19             |
| GL_CONSTANT_COLOR, 29             | GL_DEPTH_COMPONENT16, 34           |
| GL_CONVOLUTION_1D, 30             | GL_DEPTH_COMPONENT24, 34           |
| GL_CONVOLUTION_2D, 30             | GL_DEPTH_COMPONENT32, 34           |
| GL_CONVOLUTION_BORDER_COLOR, 31   | GL_DEPTH_FUNC, 19                  |
| GL_CONVOLUTION_BORDER_MODE, 30    | GL_DEPTH_RANGE, 19                 |
| GL_CONVOLUTION_FILTER_BIAS, 30    | GL_DEPTH_SCALE, 25                 |
| GL_CONVOLUTION_FILTER_SCALE, 30   | GL_DEPTH_TEST, 19                  |
| GL_CONVOLUTION_FORMAT, 30         | GL_DEPTH_TEXTURE_MODE, 34          |
| GL_CONVOLUTION_HEIGHT, 30         | GL_DEPTH_WRITEMASK, 19             |
| GL_CONVOLUTION_WIDTH, 30          | GL_DIFFUSE, 20                     |
| GL_COPY, 22                       | GL_DITHER, 23                      |
| GL_COPY_INVERTED, 22              | GL_DOMAIN, 24                      |
| GL_COPY_PIXEL_TOKEN, 21           | GL_DONT_CARE, 25                   |
| GL_CULL_FACE, 19                  | GL_DOT3_RGB, 33                    |
| GL_CULL_FACE_MODE, 19             | GL_DOT3_RGBA, 33                   |
| GL_CURRENT_BIT, 27                | GL_DOUBLE, 17                      |
| GL_CURRENT_COLOR, 23              | GL_DOUBLEBUFFER, 23                |
| GL_CURRENT_FOG_COORD, 35          | GL_DRAW_BUFFER, 23                 |
| GL_CURRENT_FOG_COORDINATE, 34     | GL_DRAW_PIXEL_TOKEN, 21            |
| GL_CURRENT_INDEX, 23              | GL_DST_ALPHA, 21                   |
| GL_CURRENT_NORMAL, 23             | GL_DST_COLOR, 21                   |
| GL_CURRENT_QUERY, 34              | GL_DYNAMIC_COPY, 35                |
| GL_CURRENT_RASTER_COLOR, 23       | GL_DYNAMIC_DRAW, 35                |
| GL_CURRENT_RASTER_DISTANCE, 24    | GL_DYNAMIC_READ, 35                |
| GL_CURRENT_RASTER_INDEX, 24       | GL_EDGE_FLAG, 19                   |
| GL_CURRENT_RASTER_POSITION, 24    | GL_EDGE_FLAG_ARRAY, 17             |
| GL_CURRENT_RASTER_POSITION_VALID, | GL_EDGE_FLAG_ARRAY_BUFFER_BINDING, |
| 24                                | 35                                 |

|                                            |                                   |
|--------------------------------------------|-----------------------------------|
| GL_EDGE_FLAG_ARRAY_POINTER, 18             | GL_FOG_COORDINATE_SOURCE, 34      |
| GL_EDGE_FLAG_ARRAY_STRIDE, 17              | GL_FOG_DENSITY, 21                |
| GL_ELEMENT_ARRAY_BUFFER, 34                | GL_FOG_END, 21                    |
| GL_ELEMENT_ARRAY_BUFFER_BINDING, 34        | GL_FOG_HINT, 25                   |
| GL_EMISSION, 20                            | GL_FOG_INDEX, 21                  |
| GL_ENABLE_BIT, 27                          | GL_FOG_MODE, 21                   |
| GL_EQUAL, 19                               | GL_FOG_START, 21                  |
| GL_EQUIV, 22                               | GL_FRAGMENT_DEPTH, 34             |
| GL_EVAL_BIT, 27                            | GL_FRONT, 18                      |
| GL_EXP, 21                                 | GL_FRONT_AND_BACK, 20             |
| GL_EXP2, 21                                | GL_FRONT_FACE, 19                 |
| GL_EXTENSIONS, 27                          | GL_FRONT_LEFT, 22                 |
| GL_EYE_LINEAR, 27                          | GL_FRONT_RIGHT, 22                |
| GL_EYE_PLANE, 27                           | GL_FUNC_ADD, 30                   |
| GL_FALSE, 17                               | GL_FUNC_REVERSE_SUBTRACT, 30      |
| GL_FALSE, 4                                | GL_FUNC_SUBTRACT, 30              |
| GL_FASTEST, 25                             | GL_GENERATE_MIPMAP, 34            |
| GL_FEEDBACK, 21                            | GL_GENERATE_MIPMAP_HINT, 34       |
| GL_FEEDBACK_BUFFER_POINTER, 21             | GL_GEQUAL, 19                     |
| GL_FEEDBACK_BUFFER_SIZE, 21                | GL_GREATER, 19                    |
| GL_FEEDBACK_BUFFER_TYPE, 21                | GL_GREEN, 23                      |
| GL_FILL, 18                                | GL_GREEN_BIAS, 25                 |
| GL_FLAT, 20                                | GL_GREEN_BITS, 23                 |
| GL_FLOAT, 17                               | GL_GREEN_SCALE, 25                |
| GL_FOG, 21                                 | GL_HINT_BIT, 27                   |
| GL_FOG_BIT, 27                             | GL_HISTOGRAM, 30                  |
| GL_FOG_COLOR, 21                           | GL_HISTOGRAM_ALPHA_SIZE, 30       |
| GL_FOG_COORD, 35                           | GL_HISTOGRAM_BLUE_SIZE, 30        |
| GL_FOG_COORD_ARRAY, 35                     | GL_HISTOGRAM_FORMAT, 30           |
| GL_FOG_COORD_ARRAY_BUFFER_BINDING, 35      | GL_HISTOGRAM_GREEN_SIZE, 30       |
| GL_FOG_COORD_ARRAY_POINTER, 35             | GL_HISTOGRAM_LUMINANCE_SIZE, 30   |
| GL_FOG_COORD_ARRAY_STRIDE, 35              | GL_HISTOGRAM_RED_SIZE, 30         |
| GL_FOG_COORD_ARRAY_TYPE, 35                | GL_HISTOGRAM_SINK, 30             |
| GL_FOG_COORD_SRC, 35                       | GL_HISTOGRAM_WIDTH, 30            |
| GL_FOG_COORDINATE, 34                      | GL_INCR, 22                       |
| GL_FOG_COORDINATE_ARRAY, 34                | GL_INCR_WRAP, 34                  |
| GL_FOG_COORDINATE_ARRAY_BUFFER_BINDING, 35 | GL_INDEX_ARRAY, 17                |
| GL_FOG_COORDINATE_ARRAY_POINTER, 34        | GL_INDEX_ARRAY_BUFFER_BINDING, 35 |
| GL_FOG_COORDINATE_ARRAY_STRIDE, 34         | GL_INDEX_ARRAY_POINTER, 18        |
| GL_FOG_COORDINATE_ARRAY_TYPE, 34           | GL_INDEX_ARRAY_STRIDE, 17         |
|                                            | GL_INDEX_ARRAY_TYPE, 17           |
|                                            | GL_INDEX_BITS, 23                 |

|                                  |                               |
|----------------------------------|-------------------------------|
| GL_INDEX_CLEAR_VALUE, 24         | GL_LINE_STIPPLE_PATTERN, 18   |
| GL_INDEX_LOGIC_OP, 21            | GL_LINE_STIPPLE_REPEAT, 18    |
| GL_INDEX_MODE, 24                | GL_LINE_STRIP, 17             |
| GL_INDEX_OFFSET, 25              | GL_LINE_TOKEN, 21             |
| GL_INDEX_SHIFT, 25               | GL_LINE_WIDTH, 18             |
| GL_INDEX_WRITEMASK, 24           | GL_LINE_WIDTH_GRANULARITY, 18 |
| GL_INT, 17                       | GL_LINE_WIDTH_RANGE, 18       |
| GL_INTENSITY, 28                 | GL_LINEAR, 21                 |
| GL_INTENSITY12, 28               | GL_LINEAR_ATTENUATION, 19     |
| GL_INTENSITY16, 28               | GL_LINEAR_MIPMAP_LINEAR, 26   |
| GL_INTENSITY4, 28                | GL_LINEAR_MIPMAP_NEAREST, 26  |
| GL_INTENSITY8, 28                | GL_LINES, 17                  |
| GL_INTERPOLATE, 33               | GL_LIST_BASE, 19              |
| GL_INVALID_ENUM, 27              | GL_LIST_BIT, 27               |
| GL_INVALID_OPERATION, 27         | GL_LIST_INDEX, 19             |
| GL_INVALID_VALUE, 27             | GL_LIST_MODE, 19              |
| GL_INVERT, 22                    | GL_LOAD, 20                   |
| GL_KEEP, 22                      | GL_LOGIC_OP, 21               |
| GL_LEFT, 22                      | GL_LOGIC_OP_MODE, 21          |
| GL_LEQUAL, 19                    | GL_LUMINANCE, 23              |
| GL_LESS, 19                      | GL_LUMINANCE12, 28            |
| GL_LIGHT0, 19                    | GL_LUMINANCE12_ALPHA12, 28    |
| GL_LIGHT1, 19                    | GL_LUMINANCE12_ALPHA4, 28     |
| GL_LIGHT2, 19                    | GL_LUMINANCE16, 28            |
| GL_LIGHT3, 19                    | GL_LUMINANCE16_ALPHA16, 28    |
| GL_LIGHT4, 19                    | GL_LUMINANCE4, 28             |
| GL_LIGHT5, 19                    | GL_LUMINANCE4_ALPHA4, 28      |
| GL_LIGHT6, 19                    | GL_LUMINANCE6_ALPHA2, 28      |
| GL_LIGHT7, 19                    | GL_LUMINANCE8, 28             |
| GL_LIGHT_MODEL_AMBIENT, 20       | GL_LUMINANCE8_ALPHA8, 28      |
| GL_LIGHT_MODEL_COLOR_CONTROL, 29 | GL_LUMINANCE_ALPHA, 23        |
| GL_LIGHT_MODEL_LOCAL_VIEWER, 20  | GL_MAP1_COLOR_4, 24           |
| GL_LIGHT_MODEL_TWO_SIDE, 20      | GL_MAP1_GRID_DOMAIN, 24       |
| GL_LIGHTING, 19                  | GL_MAP1_GRID_SEGMENTS, 24     |
| GL_LIGHTING_BIT, 27              | GL_MAP1_INDEX, 24             |
| GL_LINE, 18                      | GL_MAP1_NORMAL, 24            |
| GL_LINE_BIT, 27                  | GL_MAP1_TEXTURE_COORD_1, 24   |
| GL_LINE_LOOP, 17                 | GL_MAP1_TEXTURE_COORD_2, 24   |
| GL_LINE_RESET_TOKEN, 21          | GL_MAP1_TEXTURE_COORD_3, 24   |
| GL_LINE_SMOOTH, 18               | GL_MAP1_TEXTURE_COORD_4, 24   |
| GL_LINE_SMOOTH_HINT, 25          | GL_MAP1_VERTEX_3, 24          |
| GL_LINE_STIPPLE, 18              | GL_MAP1_VERTEX_4, 24          |

|                                      |                                       |
|--------------------------------------|---------------------------------------|
| GL_MAP2_COLOR_4, 24                  | GL_MIRRORED_REPEAT, 34                |
| GL_MAP2_GRID_DOMAIN, 24              | GL_MODELVIEW, 18                      |
| GL_MAP2_GRID_SEGMENTS, 24            | GL_MODELVIEW_MATRIX, 24               |
| GL_MAP2_INDEX, 24                    | GL_MODELVIEW_STACK_DEPTH, 24          |
| GL_MAP2_NORMAL, 24                   | GL_MODULATE, 27                       |
| GL_MAP2_TEXTURE_COORD_1, 24          | GL_MULT, 20                           |
| GL_MAP2_TEXTURE_COORD_2, 24          | GL_MULTISAMPLE, 32                    |
| GL_MAP2_TEXTURE_COORD_3, 24          | GL_MULTISAMPLE_BIT, 32                |
| GL_MAP2_TEXTURE_COORD_4, 24          | GL_N3F_V3F, 18                        |
| GL_MAP2_VERTEX_3, 24                 | GL_NAME_STACK_DEPTH, 24               |
| GL_MAP2_VERTEX_4, 24                 | GL_NAND, 22                           |
| GL_MAP_COLOR, 25                     | GL_NEAREST, 27                        |
| GL_MAP_STENCIL, 25                   | GL_NEAREST_MIPMAP_LINEAR, 26          |
| GL_MATRIX_MODE, 18                   | GL_NEAREST_MIPMAP_NEAREST, 26         |
| GL_MAX, 30                           | GL_NEVER, 19                          |
| GL_MAX_3D_TEXTURE_SIZE, 29           | GL_NICEST, 25                         |
| GL_MAX_ATTRIB_STACK_DEPTH, 23        | GL_NO_ERROR, 27                       |
| GL_MAX_CLIENT_ATTRIB_STACK_DEPTH, 23 | GL_NONE, 22                           |
| GL_MAX_CLIP_PLANES, 23               | GL_NOOP, 22                           |
| GL_MAX_COLOR_MATRIX_STACK_DEPTH, 31  | GL_NOR, 22                            |
| GL_MAX_CONVOLUTION_HEIGHT, 30        | GL_NORMAL_ARRAY, 17                   |
| GL_MAX_CONVOLUTION_WIDTH, 30         | GL_NORMAL_ARRAY_BUFFER_BINDING, 35    |
| GL_MAX_CUBE_MAP_TEXTURE_SIZE, 33     | GL_NORMAL_ARRAY_POINTER, 18           |
| GL_MAX_ELEMENTS_INDICES, 29          | GL_NORMAL_ARRAY_STRIDE, 17            |
| GL_MAX_ELEMENTS_VERTICES, 29         | GL_NORMAL_ARRAY_TYPE, 17              |
| GL_MAX_EVAL_ORDER, 23                | GL_NORMAL_MAP, 32                     |
| GL_MAX_LIGHTS, 23                    | GL_NORMALIZE, 20                      |
| GL_MAX_LIST_NESTING, 23              | GL_NOTEQUAL, 19                       |
| GL_MAX_MODELVIEW_STACK_DEPTH, 23     | GL_NUM_COMPRESSED_TEXTURE_FORMATS, 33 |
| GL_MAX_NAME_STACK_DEPTH, 23          | GL_OBJECT_LINEAR, 26                  |
| GL_MAX_PIXEL_MAP_TABLE, 23           | GL_OBJECT_PLANE, 26                   |
| GL_MAX_PROJECTION_STACK_DEPTH, 23    | GL_ONE, 20                            |
| GL_MAX_TEXTURE_LOD_BIAS, 34          | GL_ONE_MINUS_CONSTANT_ALPHA, 30       |
| GL_MAX_TEXTURE_SIZE, 23              | GL_ONE_MINUS_CONSTANT_COLOR, 30       |
| GL_MAX_TEXTURE_STACK_DEPTH, 23       | GL_ONE_MINUS_DST_ALPHA, 21            |
| GL_MAX_TEXTURE_UNITS, 32             | GL_ONE_MINUS_DST_COLOR, 21            |
| GL_MAX_VIEWPORT_DIMS, 23             | GL_ONE_MINUS_SRC_ALPHA, 21            |
| GL_MIN, 30                           | GL_ONE_MINUS_SRC_COLOR, 21            |
| GL_MINMAX, 30                        | GL_OPERANDO_ALPHA, 33                 |
| GL_MINMAX_FORMAT, 30                 | GL_OPERANDO_RGB, 33                   |
| GL_MINMAX_SINK, 30                   | GL_OPERAND1_ALPHA, 33                 |

|                                    |                                      |
|------------------------------------|--------------------------------------|
| GL_OPERAND1_RGB, 33                | GL_POINT_FADE_THRESHOLD_SIZE, 34     |
| GL_OPERAND2_ALPHA, 33              | GL_POINT_SIZE, 18                    |
| GL_OPERAND2_RGB, 33                | GL_POINT_SIZE_GRANULARITY, 18        |
| GL_OR, 22                          | GL_POINT_SIZE_MAX, 33                |
| GL_OR_INVERTED, 22                 | GL_POINT_SIZE_MIN, 33                |
| GL_OR_REVERSE, 22                  | GL_POINT_SIZE_RANGE, 18              |
| GL_ORDER, 25                       | GL_POINT_SMOOTH, 18                  |
| GL_OUT_OF_MEMORY, 27               | GL_POINT_SMOOTH_HINT, 25             |
| GL_PACK_ALIGNMENT, 26              | GL_POINT_TOKEN, 21                   |
| GL_PACK_IMAGE_HEIGHT, 29           | GL_POINTS, 17                        |
| GL_PACK_LSB_FIRST, 26              | GL_POLYGON, 17                       |
| GL_PACK_ROW_LENGTH, 26             | GL_POLYGON_BIT, 27                   |
| GL_PACK_SKIP_IMAGES, 29            | GL_POLYGON_MODE, 18                  |
| GL_PACK_SKIP_PIXELS, 26            | GL_POLYGON_OFFSET_FACTOR, 19         |
| GL_PACK_SKIP_ROWS, 26              | GL_POLYGON_OFFSET_FILL, 19           |
| GL_PACK_SWAP_BYTES, 26             | GL_POLYGON_OFFSET_LINE, 19           |
| GL_PASS_THROUGH_TOKEN, 21          | GL_POLYGON_OFFSET_POINT, 19          |
| GL_PERSPECTIVE_CORRECTION_HINT, 25 | GL_POLYGON_OFFSET_UNITS, 19          |
| GL_PIXEL_MAP_A_TO_A, 26            | GL_POLYGON_SMOOTH, 18                |
| GL_PIXEL_MAP_A_TO_A_SIZE, 25       | GL_POLYGON_SMOOTH_HINT, 25           |
| GL_PIXEL_MAP_B_TO_B, 25            | GL_POLYGON_STIPPLE, 19               |
| GL_PIXEL_MAP_B_TO_B_SIZE, 25       | GL_POLYGON_STIPPLE_BIT, 27           |
| GL_PIXEL_MAP_G_TO_G, 25            | GL_POLYGON_TOKEN, 21                 |
| GL_PIXEL_MAP_G_TO_G_SIZE, 25       | GL_POSITION, 20                      |
| GL_PIXEL_MAP_I_TO_A, 25            | GL_POST_COLOR_MATRIX_ALPHA_BIAS, 31  |
| GL_PIXEL_MAP_I_TO_A_SIZE, 25       | GL_POST_COLOR_MATRIX_ALPHA_SCALE, 31 |
| GL_PIXEL_MAP_I_TO_B, 25            | GL_POST_COLOR_MATRIX_BLUE_BIAS, 31   |
| GL_PIXEL_MAP_I_TO_B_SIZE, 25       | GL_POST_COLOR_MATRIX_BLUE_SCALE, 31  |
| GL_PIXEL_MAP_I_TO_G, 25            | GL_POST_COLOR_MATRIX_COLOR_TABLE, 31 |
| GL_PIXEL_MAP_I_TO_G_SIZE, 25       | GL_POST_COLOR_MATRIX_GREEN_BIAS, 31  |
| GL_PIXEL_MAP_I_TO_I, 25            | GL_POST_COLOR_MATRIX_GREEN_SCALE, 31 |
| GL_PIXEL_MAP_I_TO_I_SIZE, 25       | GL_POST_COLOR_MATRIX_RED_BIAS, 31    |
| GL_PIXEL_MAP_I_TO_R, 25            | GL_POST_COLOR_MATRIX_RED_SCALE, 31   |
| GL_PIXEL_MAP_I_TO_R_SIZE, 25       | GL_POST_CONVOLUTION_ALPHA_BIAS, 30   |
| GL_PIXEL_MAP_R_TO_R, 25            | GL_POST_CONVOLUTION_ALPHA_SCALE, 30  |
| GL_PIXEL_MAP_R_TO_R_SIZE, 25       | GL_POST_CONVOLUTION_BLUE_BIAS, 30    |
| GL_PIXEL_MAP_S_TO_S, 25            | GL_POST_CONVOLUTION_BLUE_SCALE, 30   |
| GL_PIXEL_MAP_S_TO_S_SIZE, 25       | GL_POST_CONVOLUTION_COLOR_TABLE, 31  |
| GL_PIXEL_MODE_BIT, 27              | GL_POST_CONVOLUTION_GREEN_BIAS, 30   |
| GL_POINT, 18                       |                                      |
| GL_POINT_BIT, 27                   |                                      |
| GL_POINT_DISTANCE_ATTENUATION, 34  |                                      |

|                                            |                                             |
|--------------------------------------------|---------------------------------------------|
| GL_POST_CONVOLUTION_GREEN_SCALE, 30        | GL_RESCALE_NORMAL, 29                       |
| GL_POST_CONVOLUTION_RED_BIAS, 30           | GL_RETURN, 20                               |
| GL_POST_CONVOLUTION_RED_SCALE, 30          | GL_RGB, 23                                  |
| GL_PREVIOUS, 33                            | GL_RGB10, 28                                |
| GL_PRIMARY_COLOR, 33                       | GL_RGB10_A2, 28                             |
| GL_PROJECTION, 18                          | GL_RGB12, 28                                |
| GL_PROJECTION_MATRIX, 24                   | GL_RGB16, 28                                |
| GL_PROJECTION_STACK_DEPTH, 24              | GL_RGB4, 28                                 |
| GL_PROXY_COLOR_TABLE, 31                   | GL_RGB5, 28                                 |
| GL_PROXY_HISTOGRAM, 30                     | GL_RGB5_A1, 28                              |
| GL_PROXY_POST_COLOR_MATRIX_COLOR_TABLE, 31 | GL_RGB8, 28                                 |
| GL_PROXY_POST_CONVOLUTION_COLOR_TABLE, 31  | GL_RGB_SCALE, 33                            |
| GL_PROXY_TEXTURE_1D, 28                    | GL_RGBA, 23                                 |
| GL_PROXY_TEXTURE_2D, 28                    | GL_RGBA12, 28                               |
| GL_PROXY_TEXTURE_3D, 29                    | GL_RGBA16, 28                               |
| GL_PROXY_TEXTURE_CUBE_MAP, 33              | GL_RGBA2, 28                                |
| GL_Q, 27                                   | GL_RGBA4, 28                                |
| GL_QUAD_STRIP, 17                          | GL_RGBA8, 28                                |
| GL_QUADRATIC_ATTENUATION, 19               | GL_RGBA_MODE, 24                            |
| GL_QUADS, 17                               | GL_RIGHT, 22                                |
| GL_QUERY_COUNTER_BITS, 34                  | GL_S, 27                                    |
| GL_QUERY_RESULT, 34                        | GL_SAMPLE_ALPHA_TO_COVERAGE, 32             |
| GL_QUERY_RESULT_AVAILABLE, 34              | GL_SAMPLE_ALPHA_TO_ONE, 32                  |
| GL_R, 27                                   | GL_SAMPLE_BUFFERS, 32                       |
| GL_R3_G3_B2, 28                            | GL_SAMPLE_COVERAGE, 32                      |
| GL_READ_BUFFER, 23                         | GL_SAMPLE_COVERAGE_INVERT, 32               |
| GL_READ_ONLY, 35                           | GL_SAMPLE_COVERAGE_VALUE, 32                |
| GL_READ_WRITE, 35                          | GL_SAMPLES, 32                              |
| GL_RED, 22                                 | GL_SAMPLES_PASSED, 35                       |
| GL_RED_BIAS, 25                            | GL_SCISSOR_BIT, 28                          |
| GL_RED_BITS, 23                            | GL_SCISSOR_BOX, 25                          |
| GL_RED_SCALE, 25                           | GL_SCISSOR_TEST, 25                         |
| GL_REDUCE, 30                              | GL_SECONDARY_COLOR_ARRAY, 34                |
| GL_REFLECTION_MAP, 32                      | GL_SECONDARY_COLOR_ARRAY_BUFFER_BINDING, 35 |
| GL_RENDER, 21                              | GL_SECONDARY_COLOR_ARRAY_POINTER, 34        |
| GL_RENDER_MODE, 24                         | GL_SECONDARY_COLOR_ARRAY_SIZE, 34           |
| GL_RENDERER, 27                            | GL_SECONDARY_COLOR_ARRAY_STRIDE, 34         |
| GL_REPEAT, 27                              | GL_SECONDARY_COLOR_ARRAY_TYPE, 34           |
| GL_REPLACE, 22                             | GL_SELECT, 21                               |
| GL_REPLICATE_BORDER, 31                    | GL_SELECTION_BUFFER_POINTER, 21             |

|                                      |                                |
|--------------------------------------|--------------------------------|
| GL_SELECTION_BUFFER_SIZE, 21         | GL_STENCIL_BUFFER_BIT, 27      |
| GL_SEPARABLE_2D, 30                  | GL_STENCIL_CLEAR_VALUE, 22     |
| GL_SEPARATE_SPECULAR_COLOR, 29       | GL_STENCIL_FAIL, 22            |
| GL_SET, 22                           | GL_STENCIL_FUNC, 22            |
| GL_SHADE_MODEL, 20                   | GL_STENCIL_INDEX, 22           |
| GL_SHININESS, 20                     | GL_STENCIL_PASS_DEPTH_FAIL, 22 |
| GL_SHORT, 17                         | GL_STENCIL_PASS_DEPTH_PASS, 22 |
| GL_SINGLE_COLOR, 29                  | GL_STENCIL_REF, 22             |
| GL_SMOOTH, 20                        | GL_STENCIL_TEST, 22            |
| GL_SMOOTH_LINE_WIDTH_GRANULARITY, 29 | GL_STENCIL_VALUE_MASK, 22      |
| GL_SMOOTH_LINE_WIDTH_RANGE, 29       | GL_STENCIL_WRITEMASK, 22       |
| GL_SMOOTH_POINT_SIZE_GRANULARITY, 29 | GL_STEREO, 23                  |
| GL_SMOOTH_POINT_SIZE_RANGE, 29       | GL_STREAM_COPY, 35             |
| GL_SOURCE0_ALPHA, 33                 | GL_STREAM_DRAW, 35             |
| GL_SOURCE0_RGB, 33                   | GL_STREAM_READ, 35             |
| GL_SOURCE1_ALPHA, 33                 | GL_SUBPIXEL_BITS, 23           |
| GL_SOURCE1_RGB, 33                   | GL_SUBTRACT, 33                |
| GL_SOURCE2_ALPHA, 33                 | GL_T, 27                       |
| GL_SOURCE2_RGB, 33                   | GL_T2F_C3F_V3F, 18             |
| GL_SPECULAR, 20                      | GL_T2F_C4F_N3F_V3F, 18         |
| GL_SPHERE_MAP, 27                    | GL_T2F_C4UB_V3F, 18            |
| GL_SPOT_CUTOFF, 19                   | GL_T2F_N3F_V3F, 18             |
| GL_SPOT_DIRECTION, 20                | GL_T2F_V3F, 18                 |
| GL_SPOT_EXPONENT, 19                 | GL_T4F_C4F_N3F_V4F, 18         |
| GL_SRC0_ALPHA, 35                    | GL_T4F_V4F, 18                 |
| GL_SRC0_RGB, 35                      | GL_TABLE_TOO_LARGE, 30         |
| GL_SRC1_ALPHA, 35                    | GL_TEXTURE, 18                 |
| GL_SRC1_RGB, 35                      | GL_TEXTURE0, 31                |
| GL_SRC2_ALPHA, 35                    | GL_TEXTURE1, 31                |
| GL_SRC2_RGB, 35                      | GL_TEXTURE10, 31               |
| GL_SRC_ALPHA, 21                     | GL_TEXTURE11, 31               |
| GL_SRC_ALPHA_SATURATE, 21            | GL_TEXTURE12, 31               |
| GL_SRC_COLOR, 21                     | GL_TEXTURE13, 31               |
| GL_STACK_OVERFLOW, 27                | GL_TEXTURE14, 32               |
| GL_STACK_UNDERFLOW, 27               | GL_TEXTURE15, 32               |
| GL_STATIC_COPY, 35                   | GL_TEXTURE16, 32               |
| GL_STATIC_DRAW, 35                   | GL_TEXTURE17, 32               |
| GL_STATIC_READ, 35                   | GL_TEXTURE18, 32               |
| GL_STENCIL, 23                       | GL_TEXTURE19, 32               |
| GL_STENCIL_BITS, 22                  | GL_TEXTURE2, 31                |
|                                      | GL_TEXTURE20, 32               |
|                                      | GL_TEXTURE21, 32               |

|                                           |                                    |
|-------------------------------------------|------------------------------------|
| GL_TEXTURE22, 32                          | GL_TEXTURE_COORD_ARRAY_STRIDE, 17  |
| GL_TEXTURE23, 32                          | GL_TEXTURE_COORD_ARRAY_TYPE, 17    |
| GL_TEXTURE24, 32                          | GL_TEXTURE_CUBE_MAP, 32            |
| GL_TEXTURE25, 32                          | GL_TEXTURE_CUBE_MAP_NEGATIVE_X, 32 |
| GL_TEXTURE26, 32                          | GL_TEXTURE_CUBE_MAP_NEGATIVE_Y, 32 |
| GL_TEXTURE27, 32                          | GL_TEXTURE_CUBE_MAP_NEGATIVE_Z, 32 |
| GL_TEXTURE28, 32                          | GL_TEXTURE_CUBE_MAP_POSITIVE_X, 32 |
| GL_TEXTURE29, 32                          | GL_TEXTURE_CUBE_MAP_POSITIVE_Y, 32 |
| GL_TEXTURE3, 31                           | GL_TEXTURE_CUBE_MAP_POSITIVE_Z, 32 |
| GL_TEXTURE30, 32                          | GL_TEXTURE_DEPTH, 29               |
| GL_TEXTURE31, 32                          | GL_TEXTURE_DEPTH_SIZE, 34          |
| GL_TEXTURE4, 31                           | GL_TEXTURE_ENV, 26                 |
| GL_TEXTURE5, 31                           | GL_TEXTURE_ENV_COLOR, 26           |
| GL_TEXTURE6, 31                           | GL_TEXTURE_ENV_MODE, 26            |
| GL_TEXTURE7, 31                           | GL_TEXTURE_FILTER_CONTROL, 34      |
| GL_TEXTURE8, 31                           | GL_TEXTURE_GEN_MODE, 26            |
| GL_TEXTURE9, 31                           | GL_TEXTURE_GEN_Q, 27               |
| GL_TEXTURE_1D, 26                         | GL_TEXTURE_GEN_R, 27               |
| GL_TEXTURE_2D, 26                         | GL_TEXTURE_GEN_S, 26               |
| GL_TEXTURE_3D, 29                         | GL_TEXTURE_GEN_T, 26               |
| GL_TEXTURE_ALPHA_SIZE, 26                 | GL_TEXTURE_GREEN_SIZE, 26          |
| GL_TEXTURE_BASE_LEVEL, 29                 | GL_TEXTURE_HEIGHT, 26              |
| GL_TEXTURE_BINDING_1D, 28                 | GL_TEXTURE_INTENSITY_SIZE, 26      |
| GL_TEXTURE_BINDING_2D, 28                 | GL_TEXTURE_INTERNAL_FORMAT, 28     |
| GL_TEXTURE_BINDING_3D, 29                 | GL_TEXTURE_LOD_BIAS, 34            |
| GL_TEXTURE_BINDING_CUBE_MAP, 32           | GL_TEXTURE_LUMINANCE_SIZE, 26      |
| GL_TEXTURE_BIT, 27                        | GL_TEXTURE_MAG_FILTER, 26          |
| GL_TEXTURE_BLUE_SIZE, 26                  | GL_TEXTURE_MATRIX, 24              |
| GL_TEXTURE_BORDER, 26                     | GL_TEXTURE_MAX_LEVEL, 29           |
| GL_TEXTURE_BORDER_COLOR, 26               | GL_TEXTURE_MAX_LOD, 29             |
| GL_TEXTURE_COMPARE_FUNC, 34               | GL_TEXTURE_MIN_FILTER, 26          |
| GL_TEXTURE_COMPARE_MODE, 34               | GL_TEXTURE_MIN_LOD, 29             |
| GL_TEXTURE_COMPONENTS, 26                 | GL_TEXTURE_PRIORITY, 28            |
| GL_TEXTURE_COMPRESSED, 33                 | GL_TEXTURE_RED_SIZE, 26            |
| GL_TEXTURE_COMPRESSED_IMAGE_SIZE, 33      | GL_TEXTURE_RESIDENT, 28            |
| GL_TEXTURE_COMPRESSION_HINT, 33           | GL_TEXTURE_STACK_DEPTH, 24         |
| GL_TEXTURE_COORD_ARRAY, 17                | GL_TEXTURE_WIDTH, 26               |
| GL_TEXTURE_COORD_ARRAY_BUFFER_BINDING, 35 | GL_TEXTURE_WRAP_R, 29              |
| GL_TEXTURE_COORD_ARRAY_POINTER, 18        | GL_TEXTURE_WRAP_S, 26              |
| GL_TEXTURE_COORD_ARRAY_SIZE, 17           | GL_TEXTURE_WRAP_T, 26              |
|                                           | GL_TRANSFORM_BIT, 27               |
|                                           | GL_TRANSPOSE_COLOR_MATRIX, 32      |

|                                           |                                    |
|-------------------------------------------|------------------------------------|
| GL_TRANSPOSE_MODELVIEW_MATRIX, 32         | 35                                 |
| GL_TRANSPOSE_PROJECTION_MATRIX, 32        | GL_VIEWPORT, 24                    |
| GL_TRANSPOSE_TEXTURE_MATRIX, 32           | GL_VIEWPORT_BIT, 27                |
| GL_TRIANGLE_FAN, 17                       | GL_WEIGHT_ARRAY_BUFFER_BINDING, 35 |
| GL_TRIANGLE_STRIP, 17                     | GL_WRITE_ONLY, 35                  |
| GL_TRIANGLES, 17                          | GL_XOR, 22                         |
| GL_TRUE, 17                               | GL_ZERO, 20                        |
| GL_TRUE, 4                                | GL_ZOOM_X, 26                      |
| GL_UNPACK_ALIGNMENT, 26                   | GL_ZOOM_Y, 26                      |
| GL_UNPACK_IMAGE_HEIGHT, 29                | glAccum, 7                         |
| GL_UNPACK_LSB_FIRST, 26                   | glActiveTexture, 7                 |
| GL_UNPACK_ROW_LENGTH, 26                  | glAlphaFunc, 7                     |
| GL_UNPACK_SKIP_IMAGES, 29                 | glAreTexturesResident, 5           |
| GL_UNPACK_SKIP_PIXELS, 26                 | glBegin, 7                         |
| GL_UNPACK_SKIP_ROWS, 26                   | glBeginQuery, 7                    |
| GL_UNPACK_SWAP_BYTES, 26                  | glBindTexture, 7                   |
| GL_UNSIGNED_BYTE, 17                      | GLbitfield, 4                      |
| GL_UNSIGNED_BYTE_2_3_3_REV, 29            | glBitmap, 7                        |
| GL_UNSIGNED_BYTE_3_3_2, 29                | glBlendColor, 7                    |
| GL_UNSIGNED_INT, 17                       | glBlendEquation, 7                 |
| GL_UNSIGNED_INT_10_10_10_2, 29            | glBlendFunc, 7                     |
| GL_UNSIGNED_INT_2_10_10_10_REV, 29        | glBlendFuncSeparate, 7             |
| GL_UNSIGNED_INT_8_8_8_8, 29               | GLboolean, 4                       |
| GL_UNSIGNED_INT_8_8_8_8_REV, 29           | GLbyte, 4                          |
| GL_UNSIGNED_SHORT, 17                     | glCallList, 7                      |
| GL_UNSIGNED_SHORT_1_5_5_5_REV, 29         | glCallLists, 7                     |
| GL_UNSIGNED_SHORT_4_4_4_4, 29             | GLclampd, 4                        |
| GL_UNSIGNED_SHORT_4_4_4_4_REV, 29         | glClear, 7                         |
| GL_UNSIGNED_SHORT_5_5_5_1, 29             | glClearAccum, 7                    |
| GL_UNSIGNED_SHORT_5_6_5, 29               | glClearColor, 7                    |
| GL_UNSIGNED_SHORT_5_6_5_REV, 29           | glClearDepth, 7                    |
| GL_V2F, 18                                | glClearIndex, 7                    |
| GL_V3F, 18                                | glClearStencil, 7                  |
| GL_VENDOR, 27                             | glClipPlane, 7                     |
| GL_VERSION, 27                            | glColor3b, 7                       |
| GL_VERTEX_ARRAY, 17                       | glColor3bv, 7                      |
| GL_VERTEX_ARRAY_BUFFER_BINDING, 34        | glColor3d, 7                       |
| GL_VERTEX_ARRAY_POINTER, 18               | glColor3dv, 7                      |
| GL_VERTEX_ARRAY_SIZE, 17                  | glColor3f, 7                       |
| GL_VERTEX_ARRAY_STRIDE, 17                | glColor3fv, 7                      |
| GL_VERTEX_ARRAY_TYPE, 17                  | glColor3i, 7                       |
| GL_VERTEX_ATTRIB_ARRAY_BUFFER_BINDING, 35 | glColor3iv, 7                      |

|                                          |   |                                          |   |
|------------------------------------------|---|------------------------------------------|---|
| <code>glColor3s</code> ,                 | 7 | <code>glCopyColorSubTable</code> ,       | 8 |
| <code>glColor3sv</code> ,                | 7 | <code>glCopyColorTable</code> ,          | 8 |
| <code>glColor3ub</code> ,                | 7 | <code>glCopyConvolutionFilter1D</code> , | 8 |
| <code>glColor3ubv</code> ,               | 7 | <code>glCopyConvolutionFilter2D</code> , | 8 |
| <code>glColor3ui</code> ,                | 8 | <code>glCopyPixels</code> ,              | 8 |
| <code>glColor3uiv</code> ,               | 8 | <code>glCopyTexImage1D</code> ,          | 8 |
| <code>glColor3us</code> ,                | 8 | <code>glCopyTexImage2D</code> ,          | 9 |
| <code>glColor3usv</code> ,               | 8 | <code>glCopyTexSubImage1D</code> ,       | 9 |
| <code>glColor4b</code> ,                 | 8 | <code>glCopyTexSubImage2D</code> ,       | 9 |
| <code>glColor4bv</code> ,                | 8 | <code>glCopyTexSubImage3D</code> ,       | 9 |
| <code>glColor4d</code> ,                 | 8 | <code>glCullFace</code> ,                | 9 |
| <code>glColor4dv</code> ,                | 8 | <code>glDeleteLists</code> ,             | 9 |
| <code>glColor4f</code> ,                 | 8 | <code>glDeleteQueries</code> ,           | 5 |
| <code>glColor4fv</code> ,                | 8 | <code>glDeleteTextures</code> ,          | 5 |
| <code>glColor4i</code> ,                 | 8 | <code>glDepthFunc</code> ,               | 9 |
| <code>glColor4iv</code> ,                | 8 | <code>glDepthMask</code> ,               | 9 |
| <code>glColor4s</code> ,                 | 8 | <code>glDepthRange</code> ,              | 9 |
| <code>glColor4sv</code> ,                | 8 | <code>glDisable</code> ,                 | 9 |
| <code>glColor4ub</code> ,                | 8 | <code>GLdouble</code> ,                  | 4 |
| <code>glColor4ubv</code> ,               | 8 | <code>glDrawBuffer</code> ,              | 9 |
| <code>glColor4ui</code> ,                | 8 | <code>glDrawPixels</code> ,              | 9 |
| <code>glColor4uiv</code> ,               | 8 | <code>glEdgeFlag</code> ,                | 9 |
| <code>glColor4us</code> ,                | 8 | <code>glEdgeFlagv</code> ,               | 9 |
| <code>glColor4usv</code> ,               | 8 | <code>glEnable</code> ,                  | 9 |
| <code>glColorMask</code> ,               | 8 | <code>glEnd</code> ,                     | 9 |
| <code>glColorMaterial</code> ,           | 8 | <code>glEndList</code> ,                 | 9 |
| <code>glColorSubTable</code> ,           | 8 | <code>glEndQuery</code> ,                | 9 |
| <code>glColorTable</code> ,              | 8 | <code>GLenum</code> ,                    | 4 |
| <code>glColorTableParameterfv</code> ,   | 8 | <code>glEvalCoord1d</code> ,             | 9 |
| <code>glColorTableParameteriv</code> ,   | 8 | <code>glEvalCoord1dv</code> ,            | 9 |
| <code>glCompressedTexImage1D</code> ,    | 8 | <code>glEvalCoord1f</code> ,             | 9 |
| <code>glCompressedTexImage2D</code> ,    | 8 | <code>glEvalCoord1fv</code> ,            | 9 |
| <code>glCompressedTexImage3D</code> ,    | 8 | <code>glEvalCoord2d</code> ,             | 9 |
| <code>glCompressedTexSubImage1D</code> , | 8 | <code>glEvalCoord2dv</code> ,            | 9 |
| <code>glCompressedTexSubImage2D</code> , | 8 | <code>glEvalCoord2f</code> ,             | 9 |
| <code>glCompressedTexSubImage3D</code> , | 8 | <code>glEvalCoord2fv</code> ,            | 9 |
| <code>glConvolutionFilter1D</code> ,     | 8 | <code>glEvalMesh1</code> ,               | 9 |
| <code>glConvolutionFilter2D</code> ,     | 8 | <code>glEvalMesh2</code> ,               | 9 |
| <code>glConvolutionParameterf</code> ,   | 8 | <code>glEvalPoint1</code> ,              | 9 |
| <code>glConvolutionParameterfv</code> ,  | 8 | <code>glEvalPoint2</code> ,              | 9 |
| <code>glConvolutionParameteri</code> ,   | 8 | <code>glFeedbackBuffer</code> ,          | 7 |
| <code>glConvolutionParameteriv</code> ,  | 8 | <code>glFinish</code> ,                  | 9 |

|                                |                             |
|--------------------------------|-----------------------------|
| glFlush, 9                     | glGetPolygonStipple, 10     |
| glFogCoorddd, 9                | glGetQueryiv, 6             |
| glFogCoorddv, 9                | glGetQueryObjectiv, 6       |
| glFogCoordf, 9                 | glGetQueryObjectuiv, 6      |
| glFogCoordfv, 9                | glGetSeparableFilter, 10    |
| glFogf, 9                      | glGetString, 6              |
| glFogfv, 9                     | glGetTexEnvfv, 5            |
| glFogi, 9                      | glGetTexEnviv, 5            |
| glFogiv, 9                     | glGetTexGendv, 6            |
| glFrontFace, 9                 | glGetTexGenfv, 6            |
| glFrustum, 9                   | glGetTexGeniv, 6            |
| glGenLists, 9                  | glGetTexImage, 10           |
| glGenQueries, 5                | glGetTexLevelParameterfv, 6 |
| glGenTextures, 5               | glGetTexLevelParameteriv, 6 |
| glGetBooleanv, 5               | glGetTexParameterfv, 6      |
| glGetBufferParameteriv, 6      | glGetTexParameteriv, 6      |
| glGetClipPlane, 6              | glHint, 10                  |
| glGetColorTable, 9             | glHistogram, 10             |
| glGetCompressedTexImage, 10    | glIndexd, 10                |
| glGetConvolutionFilter, 10     | glIndexdv, 10               |
| glGetConvolutionParameterfv, 6 | glIndexf, 10                |
| glGetConvolutionParameteriv, 6 | glIndexfv, 10               |
| glGetDoublev, 5                | glIndexi, 10                |
| glGetError, 10                 | glIndexiv, 10               |
| glGetFloatv, 5                 | glIndexMask, 10             |
| glGetHistogram, 10             | glIndexsv, 10               |
| glGetHistogramParameterfv, 6   | glIndexub, 10               |
| glGetHistogramParameteriv, 6   | glIndexubv, 10              |
| glGetIntegerv, 5               | glInitNames, 10             |
| glGetLightfv, 5                | GLint, 4                    |
| glGetLightiv, 5                | glIsBuffer, 10              |
| glGetMapdv, 6                  | glIsEnabled, 10             |
| glGetMapfv, 6                  | glIsList, 10                |
| glGetMapiv, 6                  | glIsQuery, 10               |
| glGetMaterialfv, 5             | glIsTexture, 10             |
| glGetMaterialiv, 5             | glLightf, 10                |
| glGetMinmax, 10                | glLightfv, 10               |
| glGetMinmaxParameterfv, 6      | glLighti, 10                |
| glGetMinmaxParameteriv, 6      | glLightiv, 10               |
| glGetPixelMapfv, 6             | glLightModelf, 10           |
| glGetPixelMapuiv, 6            | glLightModelfv, 10          |
| glGetPixelMapusv, 6            |                             |

|                                          |                                          |
|------------------------------------------|------------------------------------------|
| <code>glLightModeli</code> , 10          | <code>glMultiTexCoord3d</code> , 11      |
| <code>glLightModeliv</code> , 10         | <code>glMultiTexCoord3dv</code> , 11     |
| <code>glLineStipple</code> , 10          | <code>glMultiTexCoord3f</code> , 11      |
| <code>glLineWidth</code> , 10            | <code>glMultiTexCoord3fv</code> , 11     |
| <code>glListBase</code> , 10             | <code>glMultiTexCoord3i</code> , 11      |
| <code>glLoadIdentity</code> , 10         | <code>glMultiTexCoord3iv</code> , 11     |
| <code>glLoadMatrixd</code> , 10          | <code>glMultiTexCoord3s</code> , 11      |
| <code>glLoadMatrixf</code> , 10          | <code>glMultiTexCoord3sv</code> , 11     |
| <code>glLoadName</code> , 10             | <code>glMultiTexCoord4d</code> , 11      |
| <code>glLoadTransposeMatrixd</code> , 10 | <code>glMultiTexCoord4dv</code> , 12     |
| <code>glLoadTransposeMatrixf</code> , 10 | <code>glMultiTexCoord4f</code> , 12      |
| <code>glLogicOp</code> , 11              | <code>glMultiTexCoord4fv</code> , 12     |
| <code>glMap1d</code> , 11                | <code>glMultiTexCoord4i</code> , 12      |
| <code>glMap1f</code> , 11                | <code>glMultiTexCoord4iv</code> , 12     |
| <code>glMap2d</code> , 11                | <code>glMultiTexCoord4s</code> , 12      |
| <code>glMap2f</code> , 11                | <code>glMultiTexCoord4sv</code> , 12     |
| <code>glMapGrid1d</code> , 11            | <code>glMultMatrixd</code> , 11          |
| <code>glMapGrid1f</code> , 11            | <code>glMultMatrixf</code> , 11          |
| <code>glMapGrid2d</code> , 11            | <code>glMultTransposeMatrixd</code> , 11 |
| <code>glMapGrid2f</code> , 11            | <code>glMultTransposeMatrixf</code> , 11 |
| <code>glMaterialf</code> , 11            | <code>glNewList</code> , 12              |
| <code>glMaterialfv</code> , 11           | <code>glNormal3b</code> , 12             |
| <code>glMateriali</code> , 11            | <code>glNormal3bv</code> , 12            |
| <code>glMaterialiv</code> , 11           | <code>glNormal3d</code> , 12             |
| <code>glMatrixMode</code> , 11           | <code>glNormal3dv</code> , 12            |
| <code>glMinmax</code> , 11               | <code>glNormal3f</code> , 12             |
| <code>glMultiTexCoord1d</code> , 11      | <code>glNormal3fv</code> , 12            |
| <code>glMultiTexCoord1dv</code> , 11     | <code>glNormal3i</code> , 12             |
| <code>glMultiTexCoord1f</code> , 11      | <code>glNormal3iv</code> , 12            |
| <code>glMultiTexCoord1fv</code> , 11     | <code>glNormal3s</code> , 12             |
| <code>glMultiTexCoord1i</code> , 11      | <code>glNormal3sv</code> , 12            |
| <code>glMultiTexCoord1iv</code> , 11     | <code>glOrtho</code> , 12                |
| <code>glMultiTexCoord1s</code> , 11      | <code>glPassThrough</code> , 12          |
| <code>glMultiTexCoord1sv</code> , 11     | <code>glPixelMapfv</code> , 5            |
| <code>glMultiTexCoord2d</code> , 11      | <code>glPixelMapuiv</code> , 5           |
| <code>glMultiTexCoord2dv</code> , 11     | <code>glPixelMapusv</code> , 5           |
| <code>glMultiTexCoord2f</code> , 11      | <code>glPixelStoref</code> , 12          |
| <code>glMultiTexCoord2fv</code> , 11     | <code>glPixelStorei</code> , 12          |
| <code>glMultiTexCoord2i</code> , 11      | <code>glPixelTransferf</code> , 12       |
| <code>glMultiTexCoord2iv</code> , 11     | <code>glPixelTransferi</code> , 12       |
| <code>glMultiTexCoord2s</code> , 11      | <code>glPixelZoom</code> , 12            |
| <code>glMultiTexCoord2sv</code> , 11     | <code>glPointParameterf</code> , 12      |

|                                      |                                        |
|--------------------------------------|----------------------------------------|
| <code>glPointParameterfv</code> , 12 | <code>glRectdv</code> , 13             |
| <code>glPointParameteri</code> , 12  | <code>glRectf</code> , 13              |
| <code>glPointParameteriv</code> , 12 | <code>glRectfv</code> , 13             |
| <code>glPointSize</code> , 12        | <code>glRecti</code> , 13              |
| <code>glPolygonMode</code> , 12      | <code>glRectiv</code> , 13             |
| <code>glPolygonOffset</code> , 12    | <code>glRects</code> , 13              |
| <code>glPolygonStipple</code> , 12   | <code>glRectsv</code> , 13             |
| <code>glPopAttrib</code> , 12        | <code>glRenderMode</code> , 13         |
| <code>glPopClientAttrib</code> , 12  | <code>glResetHistogram</code> , 13     |
| <code>glPopMatrix</code> , 12        | <code>glResetMinmax</code> , 13        |
| <code>glPopName</code> , 12          | <code>glRotated</code> , 13            |
| <code>glPushAttrib</code> , 12       | <code>glRotatef</code> , 13            |
| <code>glPushClientAttrib</code> , 12 | <code>glSampleCoverage</code> , 13     |
| <code>glPushMatrix</code> , 12       | <code>glScaled</code> , 13             |
| <code>glPushName</code> , 12         | <code>glScalef</code> , 13             |
| <code>glRasterPos2d</code> , 12      | <code>glScissor</code> , 13            |
| <code>glRasterPos2dv</code> , 12     | <code>glSecondaryColor3b</code> , 13   |
| <code>glRasterPos2f</code> , 12      | <code>glSecondaryColor3bv</code> , 13  |
| <code>glRasterPos2fv</code> , 13     | <code>glSecondaryColor3d</code> , 13   |
| <code>glRasterPos2i</code> , 13      | <code>glSecondaryColor3dv</code> , 13  |
| <code>glRasterPos2iv</code> , 13     | <code>glSecondaryColor3f</code> , 14   |
| <code>glRasterPos2s</code> , 13      | <code>glSecondaryColor3fv</code> , 14  |
| <code>glRasterPos2sv</code> , 13     | <code>glSecondaryColor3i</code> , 14   |
| <code>glRasterPos3d</code> , 13      | <code>glSecondaryColor3iv</code> , 14  |
| <code>glRasterPos3dv</code> , 13     | <code>glSecondaryColor3s</code> , 14   |
| <code>glRasterPos3f</code> , 13      | <code>glSecondaryColor3sv</code> , 14  |
| <code>glRasterPos3fv</code> , 13     | <code>glSecondaryColor3ub</code> , 14  |
| <code>glRasterPos3i</code> , 13      | <code>glSecondaryColor3ubv</code> , 14 |
| <code>glRasterPos3iv</code> , 13     | <code>glSecondaryColor3ui</code> , 14  |
| <code>glRasterPos3s</code> , 13      | <code>glSecondaryColor3uiv</code> , 14 |
| <code>glRasterPos3sv</code> , 13     | <code>glSecondaryColor3us</code> , 14  |
| <code>glRasterPos4d</code> , 13      | <code>glSecondaryColor3usv</code> , 14 |
| <code>glRasterPos4dv</code> , 13     | <code>glSelectBuffer</code> , 7        |
| <code>glRasterPos4f</code> , 13      | <code>glSeparableFilter2D</code> , 14  |
| <code>glRasterPos4fv</code> , 13     | <code>glShadeModel</code> , 14         |
| <code>glRasterPos4i</code> , 13      | <code>GLshort</code> , 4               |
| <code>glRasterPos4iv</code> , 13     | <code>GLsizei</code> , 4               |
| <code>glRasterPos4s</code> , 13      | <code>glStencilFunc</code> , 14        |
| <code>glRasterPos4sv</code> , 13     | <code>glStencilMask</code> , 14        |
| <code>glReadBuffer</code> , 13       | <code>glStencilOp</code> , 14          |
| <code>glReadPixels</code> , 13       | <code>glTexCoord1d</code> , 14         |
| <code>glRectd</code> , 13            | <code>glTexCoord1dv</code> , 14        |

- [glTexCoord1f](#), 14
- [glTexCoord1fv](#), 14
- [glTexCoord1i](#), 14
- [glTexCoord1iv](#), 14
- [glTexCoord1s](#), 14
- [glTexCoord1sv](#), 14
- [glTexCoord2d](#), 14
- [glTexCoord2dv](#), 14
- [glTexCoord2f](#), 14
- [glTexCoord2fv](#), 14
- [glTexCoord2i](#), 14
- [glTexCoord2iv](#), 14
- [glTexCoord2s](#), 14
- [glTexCoord2sv](#), 14
- [glTexCoord3d](#), 14
- [glTexCoord3dv](#), 14
- [glTexCoord3f](#), 14
- [glTexCoord3fv](#), 14
- [glTexCoord3i](#), 14
- [glTexCoord3iv](#), 14
- [glTexCoord3s](#), 14
- [glTexCoord3sv](#), 14
- [glTexCoord4d](#), 14
- [glTexCoord4dv](#), 14
- [glTexCoord4f](#), 14
- [glTexCoord4fv](#), 15
- [glTexCoord4i](#), 15
- [glTexCoord4iv](#), 15
- [glTexCoord4s](#), 15
- [glTexCoord4sv](#), 15
- [glTexEnvf](#), 15
- [glTexEnvfv](#), 15
- [glTexEnvi](#), 15
- [glTexEnviv](#), 15
- [glTexGend](#), 15
- [glTexGendv](#), 15
- [glTexGenf](#), 15
- [glTexGenfv](#), 15
- [glTexGeni](#), 15
- [glTexGeniv](#), 15
- [glTexImage1D](#), 15
- [glTexImage2D](#), 15

- [glTexImage3D](#), 15
- [glTexParameterf](#), 15
- [glTexParameterfv](#), 15
- [glTexParameteri](#), 15
- [glTexParameteriv](#), 15
- [glTexSubImage1D](#), 15
- [glTexSubImage2D](#), 15
- [glTexSubImage3D](#), 15
- [glTranslated](#), 15
- [glTranslatef](#), 15
- [GLU](#), 1
- [GLU\\_AUTO\\_LOAD\\_MATRIX](#), 37
- [GLU\\_BEGIN](#), 38
- [GLU\\_CCW](#), 38
- [GLU\\_CULLING](#), 37
- [GLU\\_CW](#), 38
- [GLU\\_DISPLAY\\_MODE](#), 37
- [GLU\\_DOMAIN\\_DISTANCE](#), 38
- [GLU\\_EDGE\\_FLAG](#), 38
- [GLU\\_END](#), 38
- [GLU\\_ERROR](#), 36
- [GLU\\_EXTENSIONS](#), 35
- [GLU\\_EXTERIOR](#), 38
- [GLU\\_FALSE](#), 35
- [GLU\\_FILL](#), 38
- [GLU\\_FLAT](#), 38
- [GLU\\_INSIDE](#), 38
- [GLU\\_INTERIOR](#), 38
- [GLU\\_INVALID\\_ENUM](#), 35
- [GLU\\_INVALID\\_OPERATION](#), 36
- [GLU\\_INVALID\\_VALUE](#), 36
- [GLU\\_LINE](#), 38
- [GLU\\_MAP1\\_TRIM\\_2](#), 38
- [GLU\\_MAP1\\_TRIM\\_3](#), 38
- [GLU\\_NONE](#), 38
- [GLU\\_NURBS\\_BEGIN](#), 36
- [GLU\\_NURBS\\_BEGIN\\_DATA](#), 36
- [GLU\\_NURBS\\_BEGIN\\_DATA\\_EXT](#), 36
- [GLU\\_NURBS\\_BEGIN\\_EXT](#), 36
- [GLU\\_NURBS\\_COLOR](#), 36
- [GLU\\_NURBS\\_COLOR\\_DATA](#), 36
- [GLU\\_NURBS\\_COLOR\\_DATA\\_EXT](#), 36

|                            |                                     |
|----------------------------|-------------------------------------|
| GLU_NURBS_COLOR_EXT, 36    | GLU_NURBS_ERROR9, 36                |
| GLU_NURBS_END, 36          | GLU_NURBS_MODE, 37                  |
| GLU_NURBS_END_DATA, 36     | GLU_NURBS_MODE_EXT, 37              |
| GLU_NURBS_END_DATA_EXT, 36 | GLU_NURBS_NORMAL, 36                |
| GLU_NURBS_END_EXT, 36      | GLU_NURBS_NORMAL_DATA, 36           |
| GLU_NURBS_ERROR, 36        | GLU_NURBS_NORMAL_DATA_EXT, 36       |
| GLU_NURBS_ERROR1, 36       | GLU_NURBS_NORMAL_EXT, 36            |
| GLU_NURBS_ERROR10, 36      | GLU_NURBS_RENDERER, 37              |
| GLU_NURBS_ERROR11, 36      | GLU_NURBS_RENDERER_EXT, 37          |
| GLU_NURBS_ERROR12, 36      | GLU_NURBS_TESSELLATOR, 37           |
| GLU_NURBS_ERROR13, 36      | GLU_NURBS_TESSELLATOR_EXT, 37       |
| GLU_NURBS_ERROR14, 37      | GLU_NURBS_TEX_COORD_DATA_EXT, 36    |
| GLU_NURBS_ERROR15, 37      | GLU_NURBS_TEX_COORD_EXT, 36         |
| GLU_NURBS_ERROR16, 37      | GLU_NURBS_TEXTURE_COORD, 36         |
| GLU_NURBS_ERROR17, 37      | GLU_NURBS_TEXTURE_COORD_DATA, 36    |
| GLU_NURBS_ERROR18, 37      | GLU_NURBS_VERTEX, 36                |
| GLU_NURBS_ERROR19, 37      | GLU_NURBS_VERTEX_DATA, 36           |
| GLU_NURBS_ERROR2, 36       | GLU_NURBS_VERTEX_DATA_EXT, 36       |
| GLU_NURBS_ERROR20, 37      | GLU_NURBS_VERTEX_EXT, 36            |
| GLU_NURBS_ERROR21, 37      | GLU_OBJECT_PARAMETRIC_ERROR, 37     |
| GLU_NURBS_ERROR22, 37      | GLU_OBJECT_PARAMETRIC_ERROR_EXT, 37 |
| GLU_NURBS_ERROR23, 37      | GLU_OBJECT_PATH_LENGTH, 37          |
| GLU_NURBS_ERROR24, 37      | GLU_OBJECT_PATH_LENGTH_EXT, 37      |
| GLU_NURBS_ERROR25, 37      | GLU_OUT_OF_MEMORY, 36               |
| GLU_NURBS_ERROR26, 37      | GLU_OUTLINE_PATCH, 36               |
| GLU_NURBS_ERROR27, 37      | GLU_OUTLINE_POLYGON, 36             |
| GLU_NURBS_ERROR28, 37      | GLU_OUTSIDE, 38                     |
| GLU_NURBS_ERROR29, 37      | GLU_PARAMETRIC_ERROR, 37            |
| GLU_NURBS_ERROR3, 36       | GLU_PARAMETRIC_TOLERANCE, 37        |
| GLU_NURBS_ERROR30, 37      | GLU_PATH_LENGTH, 37                 |
| GLU_NURBS_ERROR31, 37      | GLU_POINT, 38                       |
| GLU_NURBS_ERROR32, 37      | GLU_SAMPLING_METHOD, 37             |
| GLU_NURBS_ERROR33, 37      | GLU_SAMPLING_TOLERANCE, 37          |
| GLU_NURBS_ERROR34, 37      | GLU_SILHOUETTE, 38                  |
| GLU_NURBS_ERROR35, 37      | GLU_SMOOTH, 38                      |
| GLU_NURBS_ERROR36, 37      | GLU_TESS_BEGIN, 38                  |
| GLU_NURBS_ERROR37, 37      | GLU_TESS_BEGIN_DATA, 38             |
| GLU_NURBS_ERROR4, 36       | GLU_TESS_BOUNDARY_ONLY, 38          |
| GLU_NURBS_ERROR5, 36       | GLU_TESS_COMBINE, 38                |
| GLU_NURBS_ERROR6, 36       | GLU_TESS_COMBINE_DATA, 38           |
| GLU_NURBS_ERROR7, 36       | GLU_TESS_COORD_TOO_LARGE, 39        |
| GLU_NURBS_ERROR8, 36       | GLU_TESS_EDGE_FLAG, 38              |

|                                                     |                                            |
|-----------------------------------------------------|--------------------------------------------|
| <a href="#">GLU_TESS_EDGE_FLAG_DATA</a> , 38        | <a href="#">gluCylinder</a> , 16           |
| <a href="#">GLU_TESS_END</a> , 38                   | <a href="#">gluDisk</a> , 16               |
| <a href="#">GLU_TESS_END_DATA</a> , 38              | <a href="#">gluErrorString</a> , 6         |
| <a href="#">GLU_TESS_ERROR</a> , 38                 | <a href="#">gluGetString</a> , 6           |
| <a href="#">GLU_TESS_ERROR1</a> , 38                | <a href="#">GLuint</a> , 4                 |
| <a href="#">GLU_TESS_ERROR2</a> , 38                | <a href="#">gluLookAt</a> , 16             |
| <a href="#">GLU_TESS_ERROR3</a> , 38                | <a href="#">gluNewQuadric</a> , 16         |
| <a href="#">GLU_TESS_ERROR4</a> , 38                | <a href="#">gluOrtho2D</a> , 16            |
| <a href="#">GLU_TESS_ERROR5</a> , 38                | <a href="#">gluPartialDisk</a> , 16        |
| <a href="#">GLU_TESS_ERROR6</a> , 38                | <a href="#">gluPerspective</a> , 16        |
| <a href="#">GLU_TESS_ERROR7</a> , 38                | <a href="#">gluPickMatrix</a> , 16         |
| <a href="#">GLU_TESS_ERROR8</a> , 38                | <a href="#">gluProject</a> , 6             |
| <a href="#">GLU_TESS_ERROR_DATA</a> , 38            | <a href="#">gluQuadricDrawStyle</a> , 16   |
| <a href="#">GLU_TESS_MAX_COORD</a> , 39             | <a href="#">gluQuadricNormals</a> , 16     |
| <a href="#">GLU_TESS_MISSING_BEGIN_CONTOUR</a> , 39 | <a href="#">gluQuadricOrientation</a> , 16 |
| <a href="#">GLU_TESS_MISSING_BEGIN_POLYGON</a> , 39 | <a href="#">gluQuadricTexture</a> , 16     |
| <a href="#">GLU_TESS_MISSING_END_CONTOUR</a> , 39   | <a href="#">gluScaleImage</a> , 16         |
| <a href="#">GLU_TESS_MISSING_END_POLYGON</a> , 39   | <a href="#">GLushort</a> , 4               |
| <a href="#">GLU_TESS_NEED_COMBINE_CALLBACK</a> , 39 | <a href="#">gluSphere</a> , 16             |
| <a href="#">GLU_TESS_TOLERANCE</a> , 38             | <a href="#">gluUnProject</a> , 6           |
| <a href="#">GLU_TESS_VERTEX</a> , 38                | <a href="#">gluUnProject4</a> , 6          |
| <a href="#">GLU_TESS_VERTEX_DATA</a> , 38           | <a href="#">glVertex2d</a> , 15            |
| <a href="#">GLU_TESS_WINDING_ABS_GEQ_TWO</a> , 39   | <a href="#">glVertex2dv</a> , 15           |
| <a href="#">GLU_TESS_WINDING_NEGATIVE</a> , 39      | <a href="#">glVertex2f</a> , 15            |
| <a href="#">GLU_TESS_WINDING_NONZERO</a> , 39       | <a href="#">glVertex2fv</a> , 15           |
| <a href="#">GLU_TESS_WINDING_ODD</a> , 39           | <a href="#">glVertex2i</a> , 15            |
| <a href="#">GLU_TESS_WINDING_POSITIVE</a> , 39      | <a href="#">glVertex2iv</a> , 15           |
| <a href="#">GLU_TESS_WINDING_RULE</a> , 38          | <a href="#">glVertex2s</a> , 15            |
| <a href="#">GLU_TRUE</a> , 35                       | <a href="#">glVertex2sv</a> , 15           |
| <a href="#">GLU_U_STEP</a> , 37                     | <a href="#">glVertex3d</a> , 15            |
| <a href="#">GLU_UNKNOWN</a> , 38                    | <a href="#">glVertex3dv</a> , 15           |
| <a href="#">GLU_V_STEP</a> , 37                     | <a href="#">glVertex3f</a> , 15            |
| <a href="#">GLU_VERSION</a> , 35                    | <a href="#">glVertex3fv</a> , 15           |
| <a href="#">GLU_VERTEX</a> , 38                     | <a href="#">glVertex3i</a> , 15            |
| <a href="#">gluBuild1DMipmapLevels</a> , 16         | <a href="#">glVertex3iv</a> , 15           |
| <a href="#">gluBuild1DMipmaps</a> , 16              | <a href="#">glVertex3s</a> , 15            |
| <a href="#">gluBuild2DMipmapLevels</a> , 16         | <a href="#">glVertex3sv</a> , 15           |
| <a href="#">gluBuild2DMipmaps</a> , 16              | <a href="#">glVertex4d</a> , 15            |
| <a href="#">gluBuild3DMipmapLevels</a> , 16         | <a href="#">glVertex4dv</a> , 16           |
| <a href="#">gluBuild3DMipmaps</a> , 16              | <a href="#">glVertex4f</a> , 16            |
| <a href="#">GLubyte</a> , 4                         | <a href="#">glVertex4fv</a> , 16           |
| <a href="#">gluCheckExtension</a> , 6               | <a href="#">glVertex4i</a> , 16            |

- [glVertex4iv](#), 16
- [glVertex4s](#), 16
- [glVertex4sv](#), 16
- [glViewport](#), 16
- [glWindowPos2d](#), 16
- [glWindowPos2dv](#), 16
- [glWindowPos2f](#), 16
- [glWindowPos2fv](#), 16
- [glWindowPos2i](#), 16
- [glWindowPos2iv](#), 16
- [glWindowPos2s](#), 16
- [glWindowPos2sv](#), 16
- [glWindowPos3d](#), 16
- [glWindowPos3dv](#), 16
- [glWindowPos3f](#), 16
- [glWindowPos3fv](#), 16
- [glWindowPos3i](#), 16
- [glWindowPos3iv](#), 16
- [glWindowPos3s](#), 16
- [glWindowPos3sv](#), 16
- Initialization, 52
- [list->gl-boolean-vector](#), 49
- [list->gl-byte-vector](#), 45
- [list->gl-double-vector](#), 49
- [list->gl-float-vector](#), 48
- [list->gl-int-vector](#), 47
- [list->gl-short-vector](#), 46
- [list->gl-ubyte-vector](#), 46
- [list->gl-uint-vector](#), 48
- [list->gl-ushort-vector](#), 47
- [make-gl-boolean-vector](#), 49
- [make-gl-byte-vector](#), 45
- [make-gl-double-vector](#), 49
- [make-gl-float-vector](#), 48
- [make-gl-int-vector](#), 47
- [make-gl-selection-record](#), 40
- [make-gl-short-vector](#), 46
- [make-gl-ubyte-vector](#), 46
- [make-gl-uint-vector](#), 48
- [make-gl-ushort-vector](#), 47
- OpenGL, 1
- OpenGL Vectors, 45
- Racket-Style OpenGL, 40
- [select-buffer->gl-uint-vector](#), 39
- [sgl](#), 40
- [sgl/bitmap](#), 51
- [sgl/gl](#), 4
- [sgl/gl-vectors](#), 45
- [sgl/init](#), 52
- [struct:gl-selection-record](#), 40
- Using OpenGL, 3
- [vector->gl-boolean-vector](#), 49
- [vector->gl-byte-vector](#), 45
- [vector->gl-double-vector](#), 49
- [vector->gl-float-vector](#), 48
- [vector->gl-int-vector](#), 47
- [vector->gl-short-vector](#), 46
- [vector->gl-ubyte-vector](#), 46
- [vector->gl-uint-vector](#), 48
- [vector->gl-ushort-vector](#), 47