GL: 3-D Graphics

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

Contents

1 Using OpenGL **3**

2 C-Style OpenGL **4**

3 Scheme-Style OpenGL **39**

4 OpenGL Vectors **44**

5 Bitmaps **50**

Index **51**

1 Using OpenGL

The `sgl/gl` library provides direct access to the C-style OpenGL API, whereas the `sgl` library provides a more Scheme-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 Scheme-friendly interface, including function names that follow Scheme 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 Scheme 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 PLT Scheme installation. For `"alpha.ss"`, try choosing the `"sk.jpg"` image distritbuted with PLT Scheme 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)
```

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 (GLU 1.3, Section 7)

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 Scheme 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
- GFfloat, GLdouble: real number
- GFclampf, 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 GLfloats, 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 Scheme system can crash. The gl-process-selection function in sgl helps interpret the results of glSelectBuffer in a Scheme-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 Scheme-Style OpenGL

```
(require sgl)
```

The functions in sgl use Scheme style names instead of C style names. To convert a C OpenGL name to a Scheme 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))
  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?
```

Scheme-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)
```

The sgl/gl-vectors module supports OpenGL programming with cvectors. 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. Using the sgl/gl-vectors module instead of using cvector directly because these functions are specialized to handling 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-ubyte-vector? v) → boolean?
  v : any/c
(make-gl-ubyte-vector pos) → gl-ubyte-vector?
  pos : exact-nonnegative-integer?
(gl-ubyte-vector v ...) → gl-ubyte-vector?
  v : ubyte?
(vector->gl-ubyte-vector v ...) → gl-ubyte-vector?
  v : (vectorof ubyte?)
(list->gl-ubyte-vector v ...) → gl-ubyte-vector?
  v : (listof ubyte?)
(gl-ubyte-vector+ vec ...+) → gl-ubyte-vector?
  vec : gl-ubyte-vector?
(gl-ubyte-vector- vec ...+) → gl-ubyte-vector?
  vec : gl-ubyte-vector?
(gl-ubyte-vector* x vec) → gl-ubyte-vector?
  x : real?
  vec : gl-ubyte-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)
```

```
(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.

Index

bitmap->gl-list
Bitmaps, 50
C-Style OpenGL
feedback-buffer->gl-float-vector
GFclampf
GFfloat, 4
gl-accum, 39
gl-active-texture, 39
gl-alpha-func, 39
gl-begin, 39
gl-begin-query, 39
gl-blend-color, 39
gl-blend-equation, 40
gl-blend-func, 40
gl-blend-func-separate, 40
gl-boolean-vector, 48
gl-boolean-vector*, 48
gl-boolean-vector+, 48
gl-boolean-vector-, 48
gl-boolean-vector?, 48
gl-byte-vector, 44
gl-byte-vector*, 44
gl-byte-vector+, 44
gl-byte-vector-, 44
gl-byte-vector?, 44
gl-call-list, 40
gl-check-extension, 40
gl-clear, 40
gl-clear-accum, 40
gl-clear-color, 40
gl-clear-depth, 40
gl-clear-index, 40
gl-clear-stencil, 40
gl-clip-plane, 40
gl-color, 40
gl-color-mask, 40
gl-color-material, 40
gl-color-v, 40
gl-copy-pixels, 40
gl-cull-face, 40
gl-cylinder, 40
gl-delete-lists, 40
gl-delete-queries, 40
gl-depth-func, 40
gl-depth-mask, 40
gl-depth-range, 40
gl-disable, 40
gl-disk, 40
gl-double-vector, 48
gl-double-vector*, 48
gl-double-vector+, 48
gl-double-vector-, 48
gl-double-vector?, 48
gl-edge-flag, 40
gl-enable, 40
gl-end, 40
gl-end-list, 40
gl-end-query, 40
gl-eval-coord, 40
gl-eval-coord-v, 40
gl-eval-mesh, 40
gl-eval-point, 40
gl-feedback-buffer->gl-float-vector, 40
gl-finish, 40
gl-float-vector, 47
gl-float-vector*, 47
gl-float-vector+, 47
gl-float-vector-, 47
gl-float-vector?, 47
gl-flush, 40
gl-front-face, 40
gl-frustum, 40
gl-gen-lists, 40
gl-gen-queries, 40
gl-get-error, 40
gl-get-gl-version-number, 43
gl-get-glu-version-number, 43
gl-get-string, 40
gl-hint, 40
gl-index, 40
gl-index-mask, 41

gl-index-v, 41
gl-init-names, 41
gl-int-vector, 46
gl-int-vector*, 46
gl-int-vector+, 46
gl-int-vector-, 46
gl-int-vector?, 46
gl-is-buffer, 41
gl-is-enabled, 41
gl-is-list, 41
gl-is-query, 41
gl-light, 41
gl-light-model, 41
gl-light-model-v, 41
gl-light-v, 41
gl-line-stipple, 41
gl-line-width, 41
gl-list-base, 41
gl-load-identity, 41
gl-load-matrix, 41
gl-load-name, 41
gl-load-transpose-matrix, 41
gl-look-at, 41
gl-map-grid, 41
gl-material, 41
gl-material-v, 41
gl-matrix-mode, 41
gl-mult-matrix, 41
gl-mult-transpose-matrix, 41
gl-multi-tex-coord, 41
gl-multi-tex-coord-v, 41
gl-new-list, 41
gl-new-quadric, 41
gl-normal, 41
gl-normal-v, 41
gl-ortho, 41
gl-ortho-2d, 41
gl-partial-disk, 41
gl-pass-through, 41
gl-perspective, 41
gl-pick-matrix, 41
gl-pixel-store, 41
gl-point-parameter, 41
gl-point-parameter-v, 41
gl-point-size, 41
gl-polygon-mode, 41
gl-polygon-offset, 41
gl-pop-attrib, 41
gl-pop-client-attrib, 41
gl-pop-matrix, 41
gl-pop-name, 42
gl-process-selection, 42
gl-project, 42
gl-push-matrix, 42
gl-push-name, 42
gl-quadric-draw-style, 42
gl-quadric-normals, 42
gl-quadric-orientation, 42
gl-quadric-texture, 42
gl-raster-pos, 42
gl-raster-pos-v, 42
gl-rect, 42
gl-rect-v, 42
gl-render-mode, 42
gl-rotate, 42
gl-sample-coverage, 42
gl-scale, 42
gl-scissor, 42
gl-secondary-color, 42
gl-secondary-color-v, 42
gl-select-buffer->gl-uint-vector, 42
gl-selection-record, 39
gl-selection-record-max-z, 39
gl-selection-record-min-z, 39
gl-selection-record-stack, 39
gl-selection-record?, 39
gl-shade-model, 42
gl-short-vector, 45
gl-short-vector*, 45
gl-short-vector+, 45
gl-short-vector-, 45
gl-short-vector?, 45
gl-sphere, 42

gl-stencil-func, 42
gl-stencil-mask, 42
gl-stencil-op, 42
gl-tex-coord, 42
gl-tex-coord-v, 42
gl-tex-gen, 42
gl-tex-gen-v, 42
gl-translate, 42
gl-u-get-string, 42
gl-ubyte-vector, 45
gl-ubyte-vector*, 45
gl-ubyte-vector+, 45
gl-ubyte-vector-, 45
gl-ubyte-vector?, 45
gl-uint-vector, 47
gl-uint-vector*, 47
gl-uint-vector+, 47
gl-uint-vector-, 47
gl-uint-vector?, 47
gl-un-project, 42
gl-un-project4, 42
gl-ushort-vector, 46
gl-ushort-vector*, 46
gl-ushort-vector+, 46
gl-ushort-vector-, 46
gl-ushort-vector?, 46
gl-vector->list, 44
gl-vector->vector, 44
gl-vector-length, 44
gl-vector-norm, 49
gl-vector-ref, 44
gl-vector-set!, 44
gl-vector?, 44
gl-vertex, 42
gl-vertex-v, 42
gl-viewport, 42
gl-window-pos, 42
gl-window-pos-v, 42
GL: 3-D Graphics, 1
GL_2_BYTES, 16
GL_2D, 20
GL_3_BYTES, 17
GL_3D, 20
GL_3D_COLOR, 20
GL_3D_COLOR_TEXTURE, 20
GL_4_BYTES, 17
GL_4D_COLOR_TEXTURE, 20
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, 31
GL_ADD, 20
GL_ADD_SIGNED, 32
GL_ALIASED_LINE_WIDTH_RANGE, 29
GL_ALIASED_POINT_SIZE_RANGE, 29
GL_ALL_ATTRIB_BITS, 27
GL_ALL_CLIENT_ATTRIB_BITS, 28
GL_ALPHA, 22
GL_ALPHA12, 27
GL_ALPHA16, 27
GL_ALPHA4, 27
GL_ALPHA8, 27
GL_ALPHA_BIAS, 24
GL_ALPHA_BITS, 22
GL_ALPHA_SCALE, 24
GL_ALPHA_TEST, 20
GL_ALPHA_TEST_FUNC, 20
GL_ALPHA_TEST_REF, 20
GL_ALWAYS, 19
GL_AMBIENT, 19
GL_AMBIENT_AND_DIFFUSE, 19
GL_AND, 21
GL_AND_INVERTED, 21
GL_AND_REVERSE, 21
GL_ARRAY_BUFFER, 33
GL_ARRAY_BUFFER_BINDING, 33
GL_ATTRIB_STACK_DEPTH, 23
GL_AUTO_NORMAL, 23
GL_AUX0, 22
GL_AUX1, 22

GL_AUX2, 22
GL_AUX3, 22
GL_AUX_BUFFERS, 22
GL_BACK, 18
GL_BACK_LEFT, 22
GL_BACK_RIGHT, 22
GL_BGR, 28
GL_BGRA, 28
GL_BITMAP, 22
GL_BITMAP_TOKEN, 21
GL_BLEND, 20
GL_BLEND_COLOR, 29
GL_BLEND_DST, 20
GL_BLEND_DST_ALPHA, 32
GL_BLEND_DST_RGB, 32
GL_BLEND_EQUATION, 29
GL_BLEND_SRC, 20
GL_BLEND_SRC_ALPHA, 32
GL_BLEND_SRC_RGB, 32
GL_BLUE, 22
GL_BLUE_BIAS, 24
GL_BLUE_BITS, 22
GL_BLUE_SCALE, 24
GL_BUFFER_ACCESS, 34
GL_BUFFER_MAP_POINTER, 34
GL_BUFFER_MAPPED, 34
GL_BUFFER_SIZE, 33
GL_BUFFER_USAGE, 33
GL_BYTE, 16
GL_C3F_V3F, 17
GL_C4F_N3F_V3F, 17
GL_C4UB_V2F, 17
GL_C4UB_V3F, 17
GL_CCW, 18
GL_CLAMP, 26
GL_CLAMP_TO_BORDER, 32
GL_CLAMP_TO_EDGE, 28
GL_CLEAR, 21
GL_CLIENT_ACTIVE_TEXTURE, 31
GL_CLIENT_ALL_ATTRIB_BITS, 28
GL_CLIENT_ATTRIB_STACK_DEPTH, 23
GL_CLIENT_PIXEL_STORE_BIT, 28
GL_CLIENT_VERTEX_ARRAY_BIT, 28
GL_CLIP_PLANE0, 20
GL_CLIP_PLANE1, 20
GL_CLIP_PLANE2, 20
GL_CLIP_PLANE3, 20
GL_CLIP_PLANE4, 20
GL_CLIP_PLANE5, 20
GL_COEFF, 24
GL_COLOR, 22
GL_COLOR_ARRAY, 17
GL_COLOR_ARRAY_BUFFER_BINDING, 33
GL_COLOR_ARRAY_POINTER, 17
GL_COLOR_ARRAY_SIZE, 17
GL_COLOR_ARRAY_STRIDE, 17
GL_COLOR_ARRAY_TYPE, 17
GL_COLOR_BUFFER_BIT, 27
GL_COLOR_CLEAR_VALUE, 23
GL_COLOR_INDEX, 22
GL_COLOR_INDEXES, 19
GL_COLOR_LOGIC_OP, 21
GL_COLOR_MATERIAL, 19
GL_COLOR_MATERIAL_FACE, 19
GL_COLOR_MATERIAL_PARAMETER, 20
GL_COLOR_MATRIX, 30
GL_COLOR_MATRIX_STACK_DEPTH, 30
GL_COLOR_SUM, 33
GL_COLOR_TABLE, 30
GL_COLOR_TABLE_ALPHA_SIZE, 30
GL_COLOR_TABLE_BIAS, 30
GL_COLOR_TABLE_BLUE_SIZE, 30
GL_COLOR_TABLE_FORMAT, 30
GL_COLOR_TABLE_GREEN_SIZE, 30
GL_COLOR_TABLE_INTENSITY_SIZE, 30
GL_COLOR_TABLE_LUMINANCE_SIZE, 30
GL_COLOR_TABLE_RED_SIZE, 30
GL_COLOR_TABLE_SCALE, 30
GL_COLOR_TABLE_WIDTH, 30
GL_COLOR_WRITEMASK, 23
GL_COMBINE, 32
GL_COMBINE_ALPHA, 32
GL_COMBINE_RGB, 32
GL_COMPARE_R_TO_TEXTURE, 33

GL_COMPILE, 18
GL_COMPILE_AND_EXECUTE, 18
GL_COMPRESSED_ALPHA, 32
GL_COMPRESSED_INTENSITY, 32
GL_COMPRESSED_LUMINANCE, 32
GL_COMPRESSED_LUMINANCE_ALPHA, 32
GL_COMPRESSED_RGB, 32
GL_COMPRESSED_RGBA, 32
GL_COMPRESSED_TEXTURE_FORMATS, 32
GL_CONSTANT, 32
GL_CONSTANT_ALPHA, 29
GL_CONSTANT_ATTENUATION, 19
GL_CONSTANT_BORDER, 30
GL_CONSTANT_COLOR, 29
GL_CONVOLUTION_1D, 29
GL_CONVOLUTION_2D, 29
GL_CONVOLUTION_BORDER_COLOR, 30
GL_CONVOLUTION_BORDER_MODE, 29
GL_CONVOLUTION_FILTER_BIAS, 29
GL_CONVOLUTION_FILTER_SCALE, 29
GL_CONVOLUTION_FORMAT, 29
GL_CONVOLUTION_HEIGHT, 29
GL_CONVOLUTION_WIDTH, 29
GL_COPY, 21
GL_COPY_INVERTED, 21
GL_COPY_PIXEL_TOKEN, 21
GL_CULL_FACE, 18
GL_CULL_FACE_MODE, 18
GL_CURRENT_BIT, 26
GL_CURRENT_COLOR, 23
GL_CURRENT_FOG_COORD, 34
GL_CURRENT_FOG_COORDINATE, 33
GL_CURRENT_INDEX, 23
GL_CURRENT_NORMAL, 23
GL_CURRENT_QUERY, 33
GL_CURRENT_RASTER_COLOR, 23
GL_CURRENT_RASTER_DISTANCE, 23
GL_CURRENT_RASTER_INDEX, 23
GL_CURRENT_RASTER_POSITION, 23
GL_CURRENT_RASTER_POSITION_VALID, 23
GL_CURRENT_RASTER_TEXTURE_COORDS, 23
GL_CURRENT_SECONDARY_COLOR, 33
GL_CURRENT_TEXTURE_COORDS, 23
GL_CW, 18
GL_DECAL, 26
GL_DECR, 22
GL_DECR_WRAP, 33
GL_DEPTH, 22
GL_DEPTH_BIAS, 24
GL_DEPTH_BITS, 19
GL_DEPTH_BUFFER_BIT, 27
GL_DEPTH_CLEAR_VALUE, 19
GL_DEPTH_COMPONENT, 19
GL_DEPTH_COMPONENT16, 33
GL_DEPTH_COMPONENT24, 33
GL_DEPTH_COMPONENT32, 33
GL_DEPTH_FUNC, 19
GL_DEPTH_RANGE, 19
GL_DEPTH_SCALE, 24
GL_DEPTH_TEST, 19
GL_DEPTH_TEXTURE_MODE, 33
GL_DEPTH_WRITEMASK, 19
GL_DIFFUSE, 19
GL_DITHER, 22
GL_DOMAIN, 24
GL_DONT_CARE, 24
GL_DOT3_RGB, 32
GL_DOT3_RGBA, 32
GL_DOUBLE, 16
GL_DOUBLEBUFFER, 22
GL_DRAW_BUFFER, 22
GL_DRAW_PIXEL_TOKEN, 21
GL_DST_ALPHA, 20
GL_DST_COLOR, 20
GL_DYNAMIC_COPY, 34
GL_DYNAMIC_DRAW, 34
GL_DYNAMIC_READ, 34
GL_EDGE_FLAG, 18
GL_EDGE_FLAG_ARRAY, 17
GL_EDGE_FLAG_ARRAY_BUFFER_BINDING, 34
GL_EDGE_FLAG_ARRAY_POINTER, 17
GL_EDGE_FLAG_ARRAY_STRIDE, 17
GL_ELEMENT_ARRAY_BUFFER, 33

GL_ELEMENT_ARRAY_BUFFER_BINDING, 33
GL_EMISSION, 19
GL_ENABLE_BIT, 27
GL_EQUAL, 19
GL_EQUIV, 21
GL_EVAL_BIT, 27
GL_EXP, 21
GL_EXP2, 21
GL_EXTENSIONS, 26
GL_EYE_LINEAR, 26
GL_EYE_PLANE, 26
GL_FALSE, 16
GL_FALSE, 4
GL_FASTEST, 24
GL_FEEDBACK, 20
GL_FEEDBACK_BUFFER_POINTER, 21
GL_FEEDBACK_BUFFER_SIZE, 21
GL_FEEDBACK_BUFFER_TYPE, 21
GL_FILL, 18
GL_FLAT, 19
GL_FLOAT, 16
GL_FOG, 21
GL_FOG_BIT, 27
GL_FOG_COLOR, 21
GL_FOG_COORD, 34
GL_FOG_COORD_ARRAY, 34
GL_FOG_COORD_ARRAY_BUFFER_BINDING, 34
GL_FOG_COORD_ARRAY_POINTER, 34
GL_FOG_COORD_ARRAY_STRIDE, 34
GL_FOG_COORD_ARRAY_TYPE, 34
GL_FOG_COORD_SRC, 34
GL_FOG_COORDINATE, 33
GL_FOG_COORDINATE_ARRAY, 33
GL_FOG_COORDINATE_ARRAY_BUFFER_BINDING, 34
GL_FOG_COORDINATE_ARRAY_POINTER, 33
GL_FOG_COORDINATE_ARRAY_STRIDE, 33
GL_FOG_COORDINATE_ARRAY_TYPE, 33
GL_FOG_COORDINATE_SOURCE, 33
GL_FOG_DENSITY, 21
GL_FOG_END, 21
GL_FOG_HINT, 24
GL_FOG_INDEX, 21
GL_FOG_MODE, 21
GL_FOG_START, 21
GL_FRAGMENT_DEPTH, 33
GL_FRONT, 18
GL_FRONT_AND_BACK, 19
GL_FRONT_FACE, 18
GL_FRONT_LEFT, 22
GL_FRONT_RIGHT, 22
GL_FUNC_ADD, 29
GL_FUNC_REVERSE_SUBTRACT, 29
GL_FUNC_SUBTRACT, 29
GL_GENERATE_MIPMAP, 33
GL_GENERATE_MIPMAP_HINT, 33
GL_GEQUAL, 19
GL_GREATER, 19
GL_GREEN, 22
GL_GREEN_BIAS, 24
GL_GREEN_BITS, 22
GL_GREEN_SCALE, 24
GL_HINT_BIT, 27
GL_HISTOGRAM, 29
GL_HISTOGRAM_ALPHA_SIZE, 29
GL_HISTOGRAM_BLUE_SIZE, 29
GL_HISTOGRAM_FORMAT, 29
GL_HISTOGRAM_GREEN_SIZE, 29
GL_HISTOGRAM_LUMINANCE_SIZE, 30
GL_HISTOGRAM_RED_SIZE, 29
GL_HISTOGRAM_SINK, 30
GL_HISTOGRAM_WIDTH, 29
GL_INCR, 22
GL_INCR_WRAP, 33
GL_INDEX_ARRAY, 17
GL_INDEX_ARRAY_BUFFER_BINDING, 34
GL_INDEX_ARRAY_POINTER, 17
GL_INDEX_ARRAY_STRIDE, 17
GL_INDEX_ARRAY_TYPE, 17
GL_INDEX_BITS, 22
GL_INDEX_CLEAR_VALUE, 23
GL_INDEX_LOGIC_OP, 21
GL_INDEX_MODE, 23

GL_INDEX_OFFSET, 24
GL_INDEX_SHIFT, 24
GL_INDEX_WRITEMASK, 23
GL_INT, 16
GL_INTENSITY, 27
GL_INTENSITY12, 27
GL_INTENSITY16, 27
GL_INTENSITY4, 27
GL_INTENSITY8, 27
GL_INTERPOLATE, 32
GL_INVALID_ENUM, 26
GL_INVALID_OPERATION, 26
GL_INVALID_VALUE, 26
GL_INVERT, 21
GL_KEEP, 22
GL_LEFT, 22
GL_LEQUAL, 19
GL_LESS, 19
GL_LIGHT0, 19
GL_LIGHT1, 19
GL_LIGHT2, 19
GL_LIGHT3, 19
GL_LIGHT4, 19
GL_LIGHT5, 19
GL_LIGHT6, 19
GL_LIGHT7, 19
GL_LIGHT_MODEL_AMBIENT, 19
GL_LIGHT_MODEL_COLOR_CONTROL, 28
GL_LIGHT_MODEL_LOCAL_VIEWER, 19
GL_LIGHT_MODEL_TWO_SIDE, 19
GL_LIGHTING, 19
GL_LIGHTING_BIT, 26
GL_LINE, 18
GL_LINE_BIT, 26
GL_LINE_LOOP, 17
GL_LINE_RESET_TOKEN, 20
GL_LINE_SMOOTH, 18
GL_LINE_SMOOTH_HINT, 24
GL_LINE_STIPPLE, 18
GL_LINE_STIPPLE_PATTERN, 18
GL_LINE_STIPPLE_REPEAT, 18
GL_LINE_STRIP, 17
GL_LINE_TOKEN, 20
GL_LINE_WIDTH, 18
GL_LINE_WIDTH_GRANULARITY, 18
GL_LINE_WIDTH_RANGE, 18
GL_LINEAR, 21
GL_LINEAR_ATTENUATION, 19
GL_LINEAR_MIPMAP_LINEAR, 26
GL_LINEAR_MIPMAP_NEAREST, 26
GL_LINES, 17
GL_LIST_BASE, 18
GL_LIST_BIT, 27
GL_LIST_INDEX, 18
GL_LIST_MODE, 18
GL_LOAD, 20
GL_LOGIC_OP, 21
GL_LOGIC_OP_MODE, 21
GL_LUMINANCE, 22
GL_LUMINANCE12, 27
GL_LUMINANCE12_ALPHA12, 27
GL_LUMINANCE12_ALPHA4, 27
GL_LUMINANCE16, 27
GL_LUMINANCE16_ALPHA16, 27
GL_LUMINANCE4, 27
GL_LUMINANCE4_ALPHA4, 27
GL_LUMINANCE6_ALPHA2, 27
GL_LUMINANCE8, 27
GL_LUMINANCE8_ALPHA8, 27
GL_LUMINANCE_ALPHA, 22
GL_MAP1_COLOR_4, 23
GL_MAP1_GRID_DOMAIN, 23
GL_MAP1_GRID_SEGMENTS, 23
GL_MAP1_INDEX, 23
GL_MAP1_NORMAL, 23
GL_MAP1_TEXTURE_COORD_1, 23
GL_MAP1_TEXTURE_COORD_2, 24
GL_MAP1_TEXTURE_COORD_3, 24
GL_MAP1_TEXTURE_COORD_4, 24
GL_MAP1_VERTEX_3, 24
GL_MAP1_VERTEX_4, 24
GL_MAP2_COLOR_4, 24
GL_MAP2_GRID_DOMAIN, 24
GL_MAP2_GRID_SEGMENTS, 24

GL_MAP2_INDEX, 24
GL_MAP2_NORMAL, 24
GL_MAP2_TEXTURE_COORD_1, 24
GL_MAP2_TEXTURE_COORD_2, 24
GL_MAP2_TEXTURE_COORD_3, 24
GL_MAP2_TEXTURE_COORD_4, 24
GL_MAP2_VERTEX_3, 24
GL_MAP2_VERTEX_4, 24
GL_MAP_COLOR, 24
GL_MAP_STENCIL, 24
GL_MATRIX_MODE, 18
GL_MAX, 29
GL_MAX_3D_TEXTURE_SIZE, 28
GL_MAX_ATTRIB_STACK_DEPTH, 23
GL_MAX_CLIENT_ATTRIB_STACK_DEPTH, 23
GL_MAX_CLIP_PLANES, 23
GL_MAX_COLOR_MATRIX_STACK_DEPTH, 30
GL_MAX_CONVOLUTION_HEIGHT, 29
GL_MAX_CONVOLUTION_WIDTH, 29
GL_MAX_CUBE_MAP_TEXTURE_SIZE, 32
GL_MAX_ELEMENTS_INDICES, 28
GL_MAX_ELEMENTS_VERTICES, 28
GL_MAX_EVAL_ORDER, 23
GL_MAX_LIGHTS, 23
GL_MAX_LIST_NESTING, 22
GL_MAX_MODELVIEW_STACK_DEPTH, 23
GL_MAX_NAME_STACK_DEPTH, 23
GL_MAX_PIXEL_MAP_TABLE, 23
GL_MAX_PROJECTION_STACK_DEPTH, 23
GL_MAX_TEXTURE_LOD_BIAS, 33
GL_MAX_TEXTURE_SIZE, 23
GL_MAX_TEXTURE_STACK_DEPTH, 23
GL_MAX_TEXTURE_UNITS, 31
GL_MAX_VIEWPORT_DIMS, 23
GL_MIN, 29
GL_MINMAX, 30
GL_MINMAX_FORMAT, 30
GL_MINMAX_SINK, 30
GL_MIRRORED_REPEAT, 33
GL_MODELVIEW, 18
GL_MODELVIEW_MATRIX, 23
GL_MODELVIEW_STACK_DEPTH, 23
GL_MODULATE, 26
GL_MULT, 20
GL_MULTISAMPLE, 31
GL_MULTISAMPLE_BIT, 31
GL_N3F_V3F, 17
GL_NAME_STACK_DEPTH, 23
GL_NAND, 21
GL_NEAREST, 26
GL_NEAREST_MIPMAP_LINEAR, 26
GL_NEAREST_MIPMAP_NEAREST, 26
GL_NEVER, 18
GL_NICEST, 24
GL_NO_ERROR, 26
GL_NONE, 22
GL_NOOP, 21
GL_NOR, 21
GL_NORMAL_ARRAY, 17
GL_NORMAL_ARRAY_BUFFER_BINDING, 33
GL_NORMAL_ARRAY_POINTER, 17
GL_NORMAL_ARRAY_STRIDE, 17
GL_NORMAL_ARRAY_TYPE, 17
GL_NORMAL_MAP, 31
GL_NORMALIZE, 20
GL_NOTEQUAL, 19
GL_NUM_COMPRESSED_TEXTURE_FORMATS, 32
GL_OBJECT_LINEAR, 26
GL_OBJECT_PLANE, 26
GL_ONE, 20
GL_ONE_MINUS_CONSTANT_ALPHA, 29
GL_ONE_MINUS_CONSTANT_COLOR, 29
GL_ONE_MINUS_DST_ALPHA, 20
GL_ONE_MINUS_DST_COLOR, 20
GL_ONE_MINUS_SRC_ALPHA, 20
GL_ONE_MINUS_SRC_COLOR, 20
GL_OPERAND0_ALPHA, 32
GL_OPERAND0_RGB, 32
GL_OPERAND1_ALPHA, 32
GL_OPERAND1_RGB, 32
GL_OPERAND2_ALPHA, 32
GL_OPERAND2_RGB, 32
GL_OR, 21

GL_OR_INVERTED, 21
GL_OR_REVERSE, 21
GL_ORDER, 24
GL_OUT_OF_MEMORY, 26
GL_PACK_ALIGNMENT, 25
GL_PACK_IMAGE_HEIGHT, 28
GL_PACK_LSB_FIRST, 25
GL_PACK_ROW_LENGTH, 25
GL_PACK_SKIP_IMAGES, 28
GL_PACK_SKIP_PIXELS, 25
GL_PACK_SKIP_ROWS, 25
GL_PACK_SWAP_BYTES, 25
GL_PASS_THROUGH_TOKEN, 21
GL_PERSPECTIVE_CORRECTION_HINT, 24
GL_PIXEL_MAP_A_TO_A, 25
GL_PIXEL_MAP_A_TO_A_SIZE, 25
GL_PIXEL_MAP_B_TO_B, 25
GL_PIXEL_MAP_B_TO_B_SIZE, 25
GL_PIXEL_MAP_G_TO_G, 25
GL_PIXEL_MAP_G_TO_G_SIZE, 25
GL_PIXEL_MAP_I_TO_A, 25
GL_PIXEL_MAP_I_TO_A_SIZE, 25
GL_PIXEL_MAP_I_TO_B, 25
GL_PIXEL_MAP_I_TO_B_SIZE, 25
GL_PIXEL_MAP_I_TO_G, 25
GL_PIXEL_MAP_I_TO_G_SIZE, 25
GL_PIXEL_MAP_I_TO_I, 25
GL_PIXEL_MAP_I_TO_I_SIZE, 24
GL_PIXEL_MAP_I_TO_R, 25
GL_PIXEL_MAP_I_TO_R_SIZE, 24
GL_PIXEL_MAP_R_TO_R, 25
GL_PIXEL_MAP_R_TO_R_SIZE, 25
GL_PIXEL_MAP_S_TO_S, 25
GL_PIXEL_MAP_S_TO_S_SIZE, 24
GL_PIXEL_MODE_BIT, 26
GL_POINT, 18
GL_POINT_BIT, 26
GL_POINT_DISTANCE_ATTENUATION, 33
GL_POINT_FADE_THRESHOLD_SIZE, 33
GL_POINT_SIZE, 18
GL_POINT_SIZE_GRANULARITY, 18
GL_POINT_SIZE_MAX, 32
GL_POINT_SIZE_MIN, 32
GL_POINT_SIZE_RANGE, 18
GL_POINT_SMOOTH, 18
GL_POINT_SMOOTH_HINT, 24
GL_POINT_TOKEN, 20
GL_POINTS, 17
GL_POLYGON, 17
GL_POLYGON_BIT, 26
GL_POLYGON_MODE, 18
GL_POLYGON_OFFSET_FACTOR, 18
GL_POLYGON_OFFSET_FILL, 18
GL_POLYGON_OFFSET_LINE, 18
GL_POLYGON_OFFSET_POINT, 18
GL_POLYGON_OFFSET_UNITS, 18
GL_POLYGON_SMOOTH, 18
GL_POLYGON_SMOOTH_HINT, 24
GL_POLYGON_STIPPLE, 18
GL_POLYGON_STIPPLE_BIT, 26
GL_POLYGON_TOKEN, 21
GL_POSITION, 19
GL_POST_COLOR_MATRIX_ALPHA_BIAS, 30
GL_POST_COLOR_MATRIX_ALPHA_SCALE, 30
GL_POST_COLOR_MATRIX_BLUE_BIAS, 30
GL_POST_COLOR_MATRIX_BLUE_SCALE, 30
GL_POST_COLOR_MATRIX_COLOR_TABLE, 30
GL_POST_COLOR_MATRIX_GREEN_BIAS, 30
GL_POST_COLOR_MATRIX_GREEN_SCALE, 30
GL_POST_COLOR_MATRIX_RED_BIAS, 30
GL_POST_COLOR_MATRIX_RED_SCALE, 30
GL_POST_CONVOLUTION_ALPHA_BIAS, 29
GL_POST_CONVOLUTION_ALPHA_SCALE, 29
GL_POST_CONVOLUTION_BLUE_BIAS, 29
GL_POST_CONVOLUTION_BLUE_SCALE, 29
GL_POST_CONVOLUTION_COLOR_TABLE, 30
GL_POST_CONVOLUTION_GREEN_BIAS, 29
GL_POST_CONVOLUTION_GREEN_SCALE, 29
GL_POST_CONVOLUTION_RED_BIAS, 29
GL_POST_CONVOLUTION_RED_SCALE, 29
GL_PREVIOUS, 32
GL_PRIMARY_COLOR, 32
GL_PROJECTION, 18
GL_PROJECTION_MATRIX, 23

GL_PROJECTION_STACK_DEPTH, 23
GL_PROXY_COLOR_TABLE, 30
GL_PROXY_HISTOGRAM, 29
GL_PROXY_POST_COLOR_MATRIX_COLOR_TABLE, 30
GL_PROXY_POST_CONVOLUTION_COLOR_TABLE, 30
GL_PROXY_TEXTURE_1D, 27
GL_PROXY_TEXTURE_2D, 27
GL_PROXY_TEXTURE_3D, 28
GL_PROXY_TEXTURE_CUBE_MAP, 32
GL_Q, 26
GL_QUAD_STRIP, 17
GL_QUADRATIC_ATTENUATION, 19
GL_QUADS, 17
GL_QUERY_COUNTER_BITS, 33
GL_QUERY_RESULT, 33
GL_QUERY_RESULT_AVAILABLE, 33
GL_R, 26
GL_R3_G3_B2, 27
GL_READ_BUFFER, 22
GL_READ_ONLY, 34
GL_READ_WRITE, 34
GL_RED, 22
GL_RED_BIAS, 24
GL_RED_BITS, 22
GL_RED_SCALE, 24
GL_REDUCE, 29
GL_REFLECTION_MAP, 31
GL_RENDER, 20
GL_RENDER_MODE, 23
GL_RENDERER, 26
GL_REPEAT, 26
GL_REPLACE, 22
GL_REPLICATE_BORDER, 30
GL_RESCALE_NORMAL, 28
GL_RETURN, 20
GL_RGB, 22
GL_RGB10, 27
GL_RGB10_A2, 28
GL_RGB12, 27
GL_RGB16, 28
GL_RGB4, 27
GL_RGB5, 27
GL_RGB5_A1, 28
GL_RGB8, 27
GL_RGB_SCALE, 32
GL_RGBA, 22
GL_RGBA12, 28
GL_RGBA16, 28
GL_RGBA2, 28
GL_RGBA4, 28
GL_RGBA8, 28
GL_RGBA_MODE, 23
GL_RIGHT, 22
GL_S, 26
GL_SAMPLE_ALPHA_TO_COVERAGE, 31
GL_SAMPLE_ALPHA_TO_ONE, 31
GL_SAMPLE_BUFFERS, 31
GL_SAMPLE_COVERAGE, 31
GL_SAMPLE_COVERAGE_INVERT, 31
GL_SAMPLE_COVERAGE_VALUE, 31
GL_SAMPLES, 31
GL_SAMPLES_PASSED, 34
GL_SCISSOR_BIT, 27
GL_SCISSOR_BOX, 24
GL_SCISSOR_TEST, 24
GL_SECONDARY_COLOR_ARRAY, 33
GL_SECONDARY_COLOR_ARRAY_BUFFER_BINDING, 34
GL_SECONDARY_COLOR_ARRAY_POINTER, 33
GL_SECONDARY_COLOR_ARRAY_SIZE, 33
GL_SECONDARY_COLOR_ARRAY_STRIDE, 33
GL_SECONDARY_COLOR_ARRAY_TYPE, 33
GL_SELECT, 20
GL_SELECTION_BUFFER_POINTER, 21
GL_SELECTION_BUFFER_SIZE, 21
GL_SEPARABLE_2D, 29
GL_SEPARATE_SPECULAR_COLOR, 29
GL_SET, 21
GL_SHADE_MODEL, 19
GL_SHININESS, 19
GL_SHORT, 16
GL_SINGLE_COLOR, 28

GL_SMOOTH, 19
GL_SMOOTH_LINE_WIDTH_GRANULARITY, 29
GL_SMOOTH_LINE_WIDTH_RANGE, 29
GL_SMOOTH_POINT_SIZE_GRANULARITY, 29
GL_SMOOTH_POINT_SIZE_RANGE, 29
GL_SOURCE0_ALPHA, 32
GL_SOURCE0_RGB, 32
GL_SOURCE1_ALPHA, 32
GL_SOURCE1_RGB, 32
GL_SOURCE2_ALPHA, 32
GL_SOURCE2_RGB, 32
GL_SPECULAR, 19
GL_SPHERE_MAP, 26
GL_SPOT_CUTOFF, 19
GL_SPOT_DIRECTION, 19
GL_SPOT_EXPONENT, 19
GL_SRC0_ALPHA, 34
GL_SRC0_RGB, 34
GL_SRC1_ALPHA, 34
GL_SRC1_RGB, 34
GL_SRC2_ALPHA, 34
GL_SRC2_RGB, 34
GL_SRC_ALPHA, 20
GL_SRC_ALPHA_SATURATE, 20
GL_SRC_COLOR, 20
GL_STACK_OVERFLOW, 26
GL_STACK_UNDERFLOW, 26
GL_STATIC_COPY, 34
GL_STATIC_DRAW, 34
GL_STATIC_READ, 34
GL_STENCIL, 22
GL_STENCIL_BITS, 21
GL_STENCIL_BUFFER_BIT, 27
GL_STENCIL_CLEAR_VALUE, 22
GL_STENCIL_FAIL, 22
GL_STENCIL_FUNC, 21
GL_STENCIL_INDEX, 22
GL_STENCIL_PASS_DEPTH_FAIL, 22
GL_STENCIL_PASS_DEPTH_PASS, 22
GL_STENCIL_REF, 21
GL_STENCIL_TEST, 21
GL_STENCIL_VALUE_MASK, 21
GL_STENCIL_WRITEMASK, 21
GL_STEREO, 22
GL_STREAM_COPY, 34
GL_STREAM_DRAW, 34
GL_STREAM_READ, 34
GL_SUBPIXEL_BITS, 22
GL_SUBTRACT, 32
GL_T, 26
GL_T2F_C3F_V3F, 18
GL_T2F_C4F_N3F_V3F, 18
GL_T2F_C4UB_V3F, 18
GL_T2F_N3F_V3F, 18
GL_T2F_V3F, 17
GL_T4F_C4F_N3F_V4F, 18
GL_T4F_V4F, 18
GL_TABLE_TOO_LARGE, 30
GL_TEXTURE, 18
GL_TEXTURE0, 30
GL_TEXTURE1, 30
GL_TEXTURE10, 31
GL_TEXTURE11, 31
GL_TEXTURE12, 31
GL_TEXTURE13, 31
GL_TEXTURE14, 31
GL_TEXTURE15, 31
GL_TEXTURE16, 31
GL_TEXTURE17, 31
GL_TEXTURE18, 31
GL_TEXTURE19, 31
GL_TEXTURE2, 30
GL_TEXTURE20, 31
GL_TEXTURE21, 31
GL_TEXTURE22, 31
GL_TEXTURE23, 31
GL_TEXTURE24, 31
GL_TEXTURE25, 31
GL_TEXTURE26, 31
GL_TEXTURE27, 31
GL_TEXTURE28, 31
GL_TEXTURE29, 31
GL_TEXTURE3, 30
GL_TEXTURE30, 31

GL_TEXTURE31, 31
GL_TEXTURE4, 30
GL_TEXTURE5, 30
GL_TEXTURE6, 30
GL_TEXTURE7, 30
GL_TEXTURE8, 30
GL_TEXTURE9, 30
GL_TEXTURE_1D, 25
GL_TEXTURE_2D, 25
GL_TEXTURE_3D, 28
GL_TEXTURE_ALPHA_SIZE, 26
GL_TEXTURE_BASE_LEVEL, 28
GL_TEXTURE_BINDING_1D, 27
GL_TEXTURE_BINDING_2D, 27
GL_TEXTURE_BINDING_3D, 28
GL_TEXTURE_BINDING_CUBE_MAP, 31
GL_TEXTURE_BIT, 27
GL_TEXTURE_BLUE_SIZE, 26
GL_TEXTURE_BORDER, 26
GL_TEXTURE_BORDER_COLOR, 25
GL_TEXTURE_COMPARE_FUNC, 33
GL_TEXTURE_COMPARE_MODE, 33
GL_TEXTURE_COMPONENTS, 26
GL_TEXTURE_COMPRESSED, 32
GL_TEXTURE_COMPRESSED_IMAGE_SIZE, 32
GL_TEXTURE_COMPRESSION_HINT, 32
GL_TEXTURE_COORD_ARRAY, 17
GL_TEXTURE_COORD_ARRAY_BUFFER_BINDING, 34
GL_TEXTURE_COORD_ARRAY_POINTER, 17
GL_TEXTURE_COORD_ARRAY_SIZE, 17
GL_TEXTURE_COORD_ARRAY_STRIDE, 17
GL_TEXTURE_COORD_ARRAY_TYPE, 17
GL_TEXTURE_CUBE_MAP, 31
GL_TEXTURE_CUBE_MAP_NEGATIVE_X, 31
GL_TEXTURE_CUBE_MAP_NEGATIVE_Y, 31
GL_TEXTURE_CUBE_MAP_NEGATIVE_Z, 32
GL_TEXTURE_CUBE_MAP_POSITIVE_X, 31
GL_TEXTURE_CUBE_MAP_POSITIVE_Y, 31
GL_TEXTURE_CUBE_MAP_POSITIVE_Z, 32
GL_TEXTURE_DEPTH, 28
GL_TEXTURE_DEPTH_SIZE, 33
GL_TEXTURE_ENV, 25
GL_TEXTURE_ENV_COLOR, 25
GL_TEXTURE_ENV_MODE, 25
GL_TEXTURE_FILTER_CONTROL, 33
GL_TEXTURE_GEN_MODE, 25
GL_TEXTURE_GEN_Q, 26
GL_TEXTURE_GEN_R, 26
GL_TEXTURE_GEN_S, 25
GL_TEXTURE_GEN_T, 25
GL_TEXTURE_GREEN_SIZE, 26
GL_TEXTURE_HEIGHT, 25
GL_TEXTURE_INTENSITY_SIZE, 26
GL_TEXTURE_INTERNAL_FORMAT, 27
GL_TEXTURE_LOD_BIAS, 33
GL_TEXTURE_LUMINANCE_SIZE, 26
GL_TEXTURE_MAG_FILTER, 25
GL_TEXTURE_MATRIX, 23
GL_TEXTURE_MAX_LEVEL, 28
GL_TEXTURE_MAX_LOD, 28
GL_TEXTURE_MIN_FILTER, 25
GL_TEXTURE_MIN_LOD, 28
GL_TEXTURE_PRIORITY, 27
GL_TEXTURE_RED_SIZE, 26
GL_TEXTURE_RESIDENT, 27
GL_TEXTURE_STACK_DEPTH, 23
GL_TEXTURE_WIDTH, 25
GL_TEXTURE_WRAP_R, 28
GL_TEXTURE_WRAP_S, 25
GL_TEXTURE_WRAP_T, 25
GL_TRANSFORM_BIT, 27
GL_TRANSPOSE_COLOR_MATRIX, 31
GL_TRANSPOSE_MODELVIEW_MATRIX, 31
GL_TRANSPOSE_PROJECTION_MATRIX, 31
GL_TRANSPOSE_TEXTURE_MATRIX, 31
GL_TRIANGLE_FAN, 17
GL_TRIANGLE_STRIP, 17
GL_TRIANGLES, 17
GL_TRUE, 16
GL_TRUE, 4
GL_UNPACK_ALIGNMENT, 25
GL_UNPACK_IMAGE_HEIGHT, 28
GL_UNPACK_LSB_FIRST, 25

GL_UNPACK_ROW_LENGTH, 25
GL_UNPACK_SKIP_IMAGES, 28
GL_UNPACK_SKIP_PIXELS, 25
GL_UNPACK_SKIP_ROWS, 25
GL_UNPACK_SWAP_BYTES, 25
GL_UNSIGNED_BYTE, 16
GL_UNSIGNED_BYTE_2_3_3_REV, 28
GL_UNSIGNED_BYTE_3_3_2, 28
GL_UNSIGNED_INT, 16
GL_UNSIGNED_INT_10_10_10_2, 28
GL_UNSIGNED_INT_2_10_10_10_REV, 28
GL_UNSIGNED_INT_8_8_8_8, 28
GL_UNSIGNED_INT_8_8_8_8_REV, 28
GL_UNSIGNED_SHORT, 16
GL_UNSIGNED_SHORT_1_5_5_5_REV, 28
GL_UNSIGNED_SHORT_4_4_4_4, 28
GL_UNSIGNED_SHORT_4_4_4_4_REV, 28
GL_UNSIGNED_SHORT_5_5_5_1, 28
GL_UNSIGNED_SHORT_5_6_5, 28
GL_UNSIGNED_SHORT_5_6_5_REV, 28
GL_V2F, 17
GL_V3F, 17
GL_VENDOR, 26
GL_VERSION, 26
GL_VERTEX_ARRAY, 17
GL_VERTEX_ARRAY_BUFFER_BINDING, 33
GL_VERTEX_ARRAY_POINTER, 17
GL_VERTEX_ARRAY_SIZE, 17
GL_VERTEX_ARRAY_STRIDE, 17
GL_VERTEX_ARRAY_TYPE, 17
GL_VERTEX_ATTRIB_ARRAY_BUFFER_BINDING, 34
GL_VIEWPORT, 23
GL_VIEWPORT_BIT, 27
GL_WEIGHT_ARRAY_BUFFER_BINDING, 34
GL_WRITE_ONLY, 34
GL_XOR, 21
GL_ZERO, 20
GL_ZOOM_X, 25
GL_ZOOM_Y, 25
glAccum, 7
glActiveTexture, 7
glAlphaFunc, 7
glAreTexturesResident, 5
glBegin, 7
glBeginQuery, 7
glBindTexture, 7
GLbitfield, 4
glBitmap, 7
glBlendColor, 7
glBlendEquation, 7
glBlendFunc, 7
glBlendFuncSeparate, 7
GLboolean, 4
GLbyte, 4
glCallList, 7
glCallLists, 7
GLclampd, 4
glClear, 7
glClearAccum, 7
glClearColor, 7
glClearDepth, 7
glClearIndex, 7
glClearStencil, 7
glClipPlane, 7
glColor3b, 7
glColor3bv, 7
glColor3d, 7
glColor3dv, 7
glColor3f, 7
glColor3fv, 7
glColor3i, 7
glColor3iv, 7
glColor3s, 7
glColor3sv, 8
glColor3ub, 8
glColor3ubv, 8
glColor3ui, 8
glColor3uiv, 8
glColor3us, 8
glColor3usv, 8
glColor4b, 8
glColor4bv, 8
glColor4d, 8

glColor4dv, 8
glColor4f, 8
glColor4fv, 8
glColor4i, 8
glColor4iv, 8
glColor4s, 8
glColor4sv, 8
glColor4ub, 8
glColor4ubv, 8
glColor4ui, 8
glColor4uiv, 8
glColor4us, 8
glColor4usv, 8
glColorMask, 8
glColorMaterial, 8
glColorSubTable, 8
glColorTable, 8
glColorTableParameterfv, 8
glColorTableParameteriv, 8
glCompressedTexImage1D, 8
glCompressedTexImage2D, 8
glCompressedTexImage3D, 8
glCompressedTexSubImage1D, 8
glCompressedTexSubImage2D, 8
glCompressedTexSubImage3D, 8
glConvolutionFilter1D, 8
glConvolutionFilter2D, 8
glConvolutionParameterf, 8
glConvolutionParameterfv, 8
glConvolutionParameteri, 8
glConvolutionParameteriv, 8
glCopyColorSubTable, 8
glCopyColorTable, 8
glCopyConvolutionFilter1D, 8
glCopyConvolutionFilter2D, 8
glCopyPixels, 8
glCopyTexImage1D, 9
glCopyTexImage2D, 9
glCopyTexSubImage1D, 9
glCopyTexSubImage2D, 9
glCopyTexSubImage3D, 9
glCullFace, 9
glDeleteLists, 9
glDeleteQueries, 5
glDeleteTextures, 5
glDepthFunc, 9
glDepthMask, 9
glDepthRange, 9
glDisable, 9
GLdouble, 4
glDrawBuffer, 9
glDrawPixels, 9
glEdgeFlag, 9
glEdgeFlagv, 9
glEnable, 9
glEnd, 9
glEndList, 9
glEndQuery, 9
GLenum, 4
glEvalCoord1d, 9
glEvalCoord1dv, 9
glEvalCoord1f, 9
glEvalCoord1fv, 9
glEvalCoord2d, 9
glEvalCoord2dv, 9
glEvalCoord2f, 9
glEvalCoord2fv, 9
glEvalMesh1, 9
glEvalMesh2, 9
glEvalPoint1, 9
glEvalPoint2, 9
glFeedbackBuffer, 7
glFinish, 9
glFlush, 9
glFogCoordd, 9
glFogCoorddv, 9
glFogCoordf, 9
glFogCoordfv, 9
glFogf, 9
glFogfv, 9
glFogi, 9
glFogiv, 9
glFrontFace, 9
glFrustum, 9

glGenLists, 9
glGenQueries, 5
glGenTextures, 5
glGetBooleanv, 5
glGetBufferParameteriv, 6
glGetClipPlane, 6
glGetColorTable, 9
glGetCompressedTexImage, 9
glGetConvolutionFilter, 10
glGetConvolutionParameterfv, 6
glGetConvolutionParameteriv, 6
glGetDoublev, 5
glGetError, 10
glGetFloatv, 5
glGetHistogram, 10
glGetHistogramParameterfv, 6
glGetHistogramParameteriv, 6
glGetIntegerv, 5
glGetLightfv, 5
glGetLightiv, 5
glGetMapdv, 6
glGetMapfv, 6
glGetMapiv, 6
glGetMaterialfv, 5
glGetMaterialiv, 5
glGetMinmax, 10
glGetMinmaxParameterfv, 6
glGetMinmaxParameteriv, 6
glGetPixelMapfv, 6
glGetPixelMapuiv, 6
glGetPixelMapusv, 6
glGetPolygonStipple, 10
glGetQueryiv, 6
glGetQueryObjectiv, 6
glGetQueryObjectuiv, 6
glGetSeparableFilter, 10
glGetString, 6
glGetTexEnvfv, 5
glGetTexEnviv, 6
glGetTexGendv, 6
glGetTexGenfv, 6
glGetTexGeniv, 6
glGetTexImage, 10
glGetTexLevelParameterfv, 6
glGetTexLevelParameteriv, 6
glGetTexParameterfv, 6
glGetTexParameteriv, 6
glHint, 10
glHistogram, 10
glIndexd, 10
glIndexdv, 10
glIndexf, 10
glIndexfv, 10
glIndexi, 10
glIndexiv, 10
glIndexMask, 10
glIndexs, 10
glIndexsv, 10
glIndexub, 10
glIndexubv, 10
glInitNames, 10
GLint, 4
glIsBuffer, 10
glIsEnabled, 10
glIsList, 10
glIsQuery, 10
glIsTexture, 10
glLightf, 10
glLightfv, 10
glLighti, 10
glLightiv, 10
glLightModelf, 10
glLightModelfv, 10
glLightModeli, 10
glLightModeliv, 10
glLineStipple, 10
glLineWidth, 10
glListBase, 10
glLoadIdentity, 10
glLoadMatrixd, 10
glLoadMatrixf, 10
glLoadName, 10
glLoadTransposeMatrixd, 10
glLoadTransposeMatrixf, 10

glLogicOp, 10
glMap1d, 10
glMap1f, 10
glMap2d, 11
glMap2f, 11
glMapGrid1d, 11
glMapGrid1f, 11
glMapGrid2d, 11
glMapGrid2f, 11
glMaterialf, 11
glMaterialfv, 11
glMateriali, 11
glMaterialiv, 11
glMatrixMode, 11
glMinmax, 11
glMultiTexCoord1d, 11
glMultiTexCoord1dv, 11
glMultiTexCoord1f, 11
glMultiTexCoord1fv, 11
glMultiTexCoord1i, 11
glMultiTexCoord1iv, 11
glMultiTexCoord1s, 11
glMultiTexCoord1sv, 11
glMultiTexCoord2d, 11
glMultiTexCoord2dv, 11
glMultiTexCoord2f, 11
glMultiTexCoord2fv, 11
glMultiTexCoord2i, 11
glMultiTexCoord2iv, 11
glMultiTexCoord2s, 11
glMultiTexCoord2sv, 11
glMultiTexCoord3d, 11
glMultiTexCoord3dv, 11
glMultiTexCoord3f, 11
glMultiTexCoord3fv, 11
glMultiTexCoord3i, 11
glMultiTexCoord3iv, 11
glMultiTexCoord3s, 11
glMultiTexCoord3sv, 11
glMultiTexCoord4d, 11
glMultiTexCoord4dv, 11
glMultiTexCoord4f, 11
glMultiTexCoord4fv, 11
glMultiTexCoord4i, 11
glMultiTexCoord4iv, 11
glMultiTexCoord4s, 12
glMultiTexCoord4sv, 12
glMultMatrixd, 11
glMultMatrixf, 11
glMultTransposeMatrixd, 11
glMultTransposeMatrixf, 11
glNewList, 12
glNormal3b, 12
glNormal3bv, 12
glNormal3d, 12
glNormal3dv, 12
glNormal3f, 12
glNormal3fv, 12
glNormal3i, 12
glNormal3iv, 12
glNormal3s, 12
glNormal3sv, 12
glOrtho, 12
glPassThrough, 12
glPixelMapfv, 5
glPixelMapuiv, 5
glPixelMapusv, 5
glPixelStoref, 12
glPixelStorei, 12
glPixelTransferf, 12
glPixelTransferi, 12
glPixelZoom, 12
glPointParameterf, 12
glPointParameterfv, 12
glPointParameteri, 12
glPointParameteriv, 12
glPointSize, 12
glPolygonMode, 12
glPolygonOffset, 12
glPolygonStipple, 12
glPopAttrib, 12
glPopClientAttrib, 12
glPopMatrix, 12
glPopName, 12

glPushAttrib, 12
glPushClientAttrib, 12
glPushMatrix, 12
glPushName, 12
glRasterPos2d, 12
glRasterPos2dv, 12
glRasterPos2f, 12
glRasterPos2fv, 12
glRasterPos2i, 12
glRasterPos2iv, 12
glRasterPos2s, 12
glRasterPos2sv, 12
glRasterPos3d, 12
glRasterPos3dv, 12
glRasterPos3f, 13
glRasterPos3fv, 13
glRasterPos3i, 13
glRasterPos3iv, 13
glRasterPos3s, 13
glRasterPos3sv, 13
glRasterPos4d, 13
glRasterPos4dv, 13
glRasterPos4f, 13
glRasterPos4fv, 13
glRasterPos4i, 13
glRasterPos4iv, 13
glRasterPos4s, 13
glRasterPos4sv, 13
glReadBuffer, 13
glReadPixels, 13
glRectd, 13
glRectdv, 13
glRectf, 13
glRectfv, 13
glRecti, 13
glRectiv, 13
glRects, 13
glRectsv, 13
glRenderMode, 13
glResetHistogram, 13
glResetMinmax, 13
glRotated, 13
glRotatef, 13
glSampleCoverage, 13
glScaled, 13
glScalef, 13
glScissor, 13
glSecondaryColor3b, 13
glSecondaryColor3bv, 13
glSecondaryColor3d, 13
glSecondaryColor3dv, 13
glSecondaryColor3f, 13
glSecondaryColor3fv, 13
glSecondaryColor3i, 13
glSecondaryColor3iv, 13
glSecondaryColor3s, 13
glSecondaryColor3sv, 13
glSecondaryColor3ub, 13
glSecondaryColor3ubv, 13
glSecondaryColor3ui, 13
glSecondaryColor3uiv, 14
glSecondaryColor3us, 14
glSecondaryColor3usv, 14
glSelectBuffer, 7
glSeparableFilter2D, 14
glShadeModel, 14
GLshort, 4
GLsizei, 4
glStencilFunc, 14
glStencilMask, 14
glStencilOp, 14
glTexCoord1d, 14
glTexCoord1dv, 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, 14
glTexCoord4i, 14
glTexCoord4iv, 14
glTexCoord4s, 14
glTexCoord4sv, 14
glTexEnvf, 14
glTexEnvfv, 14
glTexEnvi, 14
glTexEnviv, 14
glTexGend, 14
glTexGendv, 14
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, 36
GLU_BEGIN, 37
GLU_CCW, 37
GLU_CULLING, 36
GLU_CW, 37
GLU_DISPLAY_MODE, 36
GLU_DOMAIN_DISTANCE, 36
GLU_EDGE_FLAG, 37
GLU_END, 37
GLU_ERROR, 35
GLU_EXTENSIONS, 34
GLU_EXTERIOR, 37
GLU_FALSE, 34
GLU_FILL, 36
GLU_FLAT, 37
GLU_INSIDE, 37
GLU_INTERIOR, 37
GLU_INVALID_ENUM, 34
GLU_INVALID_OPERATION, 34
GLU_INVALID_VALUE, 34
GLU_LINE, 36
GLU_MAP1_TRIM_2, 36
GLU_MAP1_TRIM_3, 36
GLU_NONE, 37
GLU_NURBS_BEGIN, 35
GLU_NURBS_BEGIN_DATA, 35
GLU_NURBS_BEGIN_DATA_EXT, 35
GLU_NURBS_BEGIN_EXT, 35
GLU_NURBS_COLOR, 35
GLU_NURBS_COLOR_DATA, 35
GLU_NURBS_COLOR_DATA_EXT, 35
GLU_NURBS_COLOR_EXT, 35
GLU_NURBS_END, 35
GLU_NURBS_END_DATA, 35
GLU_NURBS_END_DATA_EXT, 35
GLU_NURBS_END_EXT, 35
GLU_NURBS_ERROR, 35
GLU_NURBS_ERROR1, 35
GLU_NURBS_ERROR10, 35
GLU_NURBS_ERROR11, 35
GLU_NURBS_ERROR12, 35
GLU_NURBS_ERROR13, 35

GLU_NURBS_ERROR14, 35
GLU_NURBS_ERROR15, 35
GLU_NURBS_ERROR16, 35
GLU_NURBS_ERROR17, 35
GLU_NURBS_ERROR18, 35
GLU_NURBS_ERROR19, 35
GLU_NURBS_ERROR2, 35
GLU_NURBS_ERROR20, 36
GLU_NURBS_ERROR21, 36
GLU_NURBS_ERROR22, 36
GLU_NURBS_ERROR23, 36
GLU_NURBS_ERROR24, 36
GLU_NURBS_ERROR25, 36
GLU_NURBS_ERROR26, 36
GLU_NURBS_ERROR27, 36
GLU_NURBS_ERROR28, 36
GLU_NURBS_ERROR29, 36
GLU_NURBS_ERROR3, 35
GLU_NURBS_ERROR30, 36
GLU_NURBS_ERROR31, 36
GLU_NURBS_ERROR32, 36
GLU_NURBS_ERROR33, 36
GLU_NURBS_ERROR34, 36
GLU_NURBS_ERROR35, 36
GLU_NURBS_ERROR36, 36
GLU_NURBS_ERROR37, 36
GLU_NURBS_ERROR4, 35
GLU_NURBS_ERROR5, 35
GLU_NURBS_ERROR6, 35
GLU_NURBS_ERROR7, 35
GLU_NURBS_ERROR8, 35
GLU_NURBS_ERROR9, 35
GLU_NURBS_MODE, 36
GLU_NURBS_MODE_EXT, 36
GLU_NURBS_NORMAL, 35
GLU_NURBS_NORMAL_DATA, 35
GLU_NURBS_NORMAL_DATA_EXT, 35
GLU_NURBS_NORMAL_EXT, 35
GLU_NURBS_RENDERER, 36
GLU_NURBS_RENDERER_EXT, 36
GLU_NURBS_TESSELLATOR, 36
GLU_NURBS_TESSELLATOR_EXT, 36
GLU_NURBS_TEX_COORD_DATA_EXT, 35
GLU_NURBS_TEX_COORD_EXT, 35
GLU_NURBS_TEXTURE_COORD, 35
GLU_NURBS_TEXTURE_COORD_DATA, 35
GLU_NURBS_VERTEX, 35
GLU_NURBS_VERTEX_DATA, 35
GLU_NURBS_VERTEX_DATA_EXT, 35
GLU_NURBS_VERTEX_EXT, 35
GLU_OBJECT_PARAMETRIC_ERROR, 36
GLU_OBJECT_PARAMETRIC_ERROR_EXT, 36
GLU_OBJECT_PATH_LENGTH, 36
GLU_OBJECT_PATH_LENGTH_EXT, 36
GLU_OUT_OF_MEMORY, 34
GLU_OUTLINE_PATCH, 35
GLU_OUTLINE_POLYGON, 34
GLU_OUTSIDE, 37
GLU_PARAMETRIC_ERROR, 36
GLU_PARAMETRIC_TOLERANCE, 36
GLU_PATH_LENGTH, 36
GLU_POINT, 36
GLU_SAMPLING_METHOD, 36
GLU_SAMPLING_TOLERANCE, 36
GLU_SILHOUETTE, 36
GLU_SMOOTH, 36
GLU_TESS_BEGIN, 37
GLU_TESS_BEGIN_DATA, 37
GLU_TESS_BOUNDARY_ONLY, 37
GLU_TESS_COMBINE, 37
GLU_TESS_COMBINE_DATA, 37
GLU_TESS_COORD_TOO_LARGE, 37
GLU_TESS_EDGE_FLAG, 37
GLU_TESS_EDGE_FLAG_DATA, 37
GLU_TESS_END, 37
GLU_TESS_END_DATA, 37
GLU_TESS_ERROR, 37
GLU_TESS_ERROR1, 37
GLU_TESS_ERROR2, 37
GLU_TESS_ERROR3, 37
GLU_TESS_ERROR4, 37
GLU_TESS_ERROR5, 37
GLU_TESS_ERROR6, 37
GLU_TESS_ERROR7, 37

GLU_TESS_ERROR8, 37
GLU_TESS_ERROR_DATA, 37
GLU_TESS_MAX_COORD, 38
GLU_TESS_MISSING_BEGIN_CONTOUR, 37
GLU_TESS_MISSING_BEGIN_POLYGON, 37
GLU_TESS_MISSING_END_CONTOUR, 37
GLU_TESS_MISSING_END_POLYGON, 37
GLU_TESS_NEED_COMBINE_CALLBACK, 37
GLU_TESS_TOLERANCE, 37
GLU_TESS_VERTEX, 37
GLU_TESS_VERTEX_DATA, 37
GLU_TESS_WINDING_ABS_GEQ_TWO, 38
GLU_TESS_WINDING_NEGATIVE, 37
GLU_TESS_WINDING_NONZERO, 37
GLU_TESS_WINDING_ODD, 37
GLU_TESS_WINDING_POSITIVE, 37
GLU_TESS_WINDING_RULE, 37
GLU_TRUE, 34
GLU_U_STEP, 36
GLU_UNKNOWN, 37
GLU_V_STEP, 36
GLU_VERSION, 34
GLU_VERTEX, 37
gluBuild1DMipmapLevels, 16
gluBuild1DMipmaps, 16
gluBuild2DMipmapLevels, 16
gluBuild2DMipmaps, 16
gluBuild3DMipmapLevels, 16
gluBuild3DMipmaps, 16
GLubyte, 4
gluCheckExtension, 6
gluCylinder, 16
gluDisk, 16
gluErrorString, 6
gluGetString, 6
GLuint, 4
gluLookAt, 16
gluNewQuadric, 16
gluOrtho2D, 16
gluPartialDisk, 16
gluPerspective, 16
gluPickMatrix, 16
gluProject, 6
gluQuadricDrawStyle, 16
gluQuadricNormals, 16
gluQuadricOrientation, 16
gluQuadricTexture, 16
gluScaleImage, 16
GLushort, 4
gluSphere, 16
gluUnProject, 6
gluUnProject4, 6
glVertex2d, 15
glVertex2dv, 15
glVertex2f, 15
glVertex2fv, 15
glVertex2i, 15
glVertex2iv, 15
glVertex2s, 15
glVertex2sv, 15
glVertex3d, 15
glVertex3dv, 15
glVertex3f, 15
glVertex3fv, 15
glVertex3i, 15
glVertex3iv, 15
glVertex3s, 15
glVertex3sv, 15
glVertex4d, 15
glVertex4dv, 15
glVertex4f, 15
glVertex4fv, 15
glVertex4i, 15
glVertex4iv, 15
glVertex4s, 15
glVertex4sv, 15
glViewport, 15
glWindowPos2d, 15
glWindowPos2dv, 15
glWindowPos2f, 15
glWindowPos2fv, 15
glWindowPos2i, 15
glWindowPos2iv, 16
glWindowPos2s, 16

glWindowPos2sv, 16
glWindowPos3d, 16
glWindowPos3dv, 16
glWindowPos3f, 16
glWindowPos3fv, 16
glWindowPos3i, 16
glWindowPos3iv, 16
glWindowPos3s, 16
glWindowPos3sv, 16
list->gl-boolean-vector
list->gl-byte-vector, 44
list->gl-double-vector, 48
list->gl-float-vector, 47
list->gl-int-vector, 46
list->gl-short-vector, 45
list->gl-ubyte-vector, 45
list->gl-uint-vector, 47
list->gl-ushort-vector, 46
make-gl-boolean-vector
make-gl-byte-vector, 44
make-gl-double-vector, 48
make-gl-float-vector, 47
make-gl-int-vector, 46
make-gl-selection-record, 39
make-gl-short-vector, 45
make-gl-ubyte-vector, 45
make-gl-uint-vector, 47
make-gl-ushort-vector, 46
OpenGL
OpenGL Vectors, 44
Scheme-Style OpenGL
select-buffer->gl-uint-vector, 38
sgl, 39
sgl/bitmap, 50
sgl/gl, 4
sgl/gl-vectors, 44
struct:gl-selection-record, 39
Using OpenGL
vector->gl-boolean-vector
vector->gl-byte-vector, 44
vector->gl-double-vector, 48
vector->gl-float-vector, 47
vector->gl-int-vector, 46
vector->gl-short-vector, 45
vector->gl-ubyte-vector, 45
vector->gl-uint-vector, 47
vector->gl-ushort-vector, 46