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.

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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 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-process-selection : 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.

```
(process-selection vec hits) → (listof 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.

(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.

(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.

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