OPENGL PRIMITIVES AND ATTRIBUTES & APPROXIMATING A SPHERE

2.3   Primitives and attributes

OpenGL supports 2 types of primitives :

- Geometric primitives (vertices, line segments..) – they pass through the geometric pipeline

- Raster primitives (arrays of pixels) – passes through a separate pipeline to the frame buffer.

Line segments

GL_LINES

GL_LINE_STRIP

GL_LINE_LOOP

Polygons :

Polygons :Object that has a border that can be described by a line loop & also has a well defined interior

Properties of polygon for it to be rendered correctly :

- Simple – No 2 edges of a polygon cross each other
- Convex – All points on the line segment between any 2 points inside the object, or on its boundary, are inside the object.
- Flat – All the vertices forming the polygon lie in the same plane . E.g. a triangle.

Polygon Issues

- User program can check if above true
  - OpenGL will produce output if these conditions are violated but it may not be what is desired
- Triangles satisfy all conditions

2.4   Approximating a sphere

- Fans and strips allow us to approximate curved surfaces in a simple way.
- E.g. – a unit sphere can be described by the following set of equations :
- $X(\Theta,\Phi)=\sin\Theta\cos\Phi,$
- $Y(\Theta,\Phi)=\cos\Theta\sin\Phi,$
- $Z(\Theta,\Phi)=\sin\Phi$

The sphere shown is constructed using quad strips.

A circle could be approximated using Quad strips.

The poles of the sphere are constructed using triangle fans as can be seen in the diagram
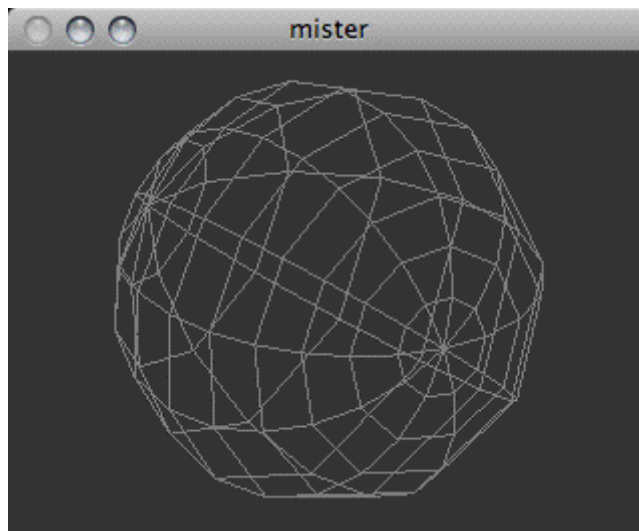
Graphics Text :

   A graphics application should also be able to provide textual display.

- There are 2 forms of text :
   - Stroke text – Like any other geometric object, vertices are used to define line segments & curves that form the outline of each character.
   - Raster text – Characters are defined as rectangles of bits called **bit blocks.**

   bit-block-transfer : the entire block of bits can be moved to the frame buffer using a single function call.