

Assignment 3

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Due Feb. 22

Each of the following three problems is worth five points.

1. A fundamental operation in a graphics system is mapping a point (x, y) that lies within a clipping rectangle to a point (x_s, y_s) that lies in the viewport of a window on the screen. Assume that the two rectangles are defined by the viewport specified by

```
glViewport(u, v, w, h);
```

and a clipping rectangle specified by $x_{\min} \leq x \leq x_{\max}$, $y_{\min} \leq y \leq y_{\max}$. Find the mathematical equations that map (x, y) into (x_s, y_s) .

2. Write the function (either C++ code or pseudo code is fine)

```
void partialDisk(GLfloat inner, GLfloat outer,  
                GLfloat start, GLfloat end, GLuint slices)
```

which generates the vertices for rendering a partial disk. For example, here is the result of calling

```
partialDisk(0.25, 0.75, M_PI / 2.0, 2.0 * M_PI, 72);
```



BIG hint: Using `GL_TRIANGLE_STRIP`, this can be done by generating `2 * slices` vertices.

3. Devise a test to determine whether or not a polygon is simple. Assume that the polygon is represented as a set of line segments.