

COSC 4370 – HOMEWORK 1

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1. PROBLEM

The assignment requires rasterizing ellipse $\frac{x^2}{12^2} + \frac{y^2}{6^2} = 64^2$ where $y \geq 0$.

2. METHOD

First, convert the above equation to a y equation in terms of x. Because $y \geq 0$, it does not matter when $y < 0$.

$$y = 6 \times \sqrt{64^2 - \frac{x^2}{12^2}}$$

The general idea behind the method used was to look at every location (x and y coordinates). Apply a loop of x, and for each x there will be a y based on the equation above. Connecting all those points together will give the ellipse as the assignment requires.

3. IMPLEMENTATION

First, it is necessary to define the bounds of the above ellipse. Because the center of the ellipse is at (0, 0), it will intersect the horizontal axis at (-768, 0) and (768, 0); and intersect the vertical axis at (0, 384).

Assuming each pixel is a unit and the center of the ellipse in the center of the image so the dimension of the image should be radius \times radius (2000×2000) to contain the ellipse. The center of the ellipse will be at (1000, 1000) of the image. There will be 2 loops to draw the ellipse, one to draw the right part of the ellipse, and one to draw the left part.

- Based on the intersection between the ellipse and the horizontal axis, the first loop will run x from 0 to 768 and y in terms of x using the equation above. However, as said the center of the ellipse is the position (1000, 1000) not (0, 0) of the image, so 1000 must be added to x and y .
- The second loop will draw the left part of the ellipse. So the loop will run x from -768 to 0 and y will still be in terms of x using the equation above. Similar to the first loop, it is necessary to add 1000 to x and y .

4. RESULTS

The output of the program was a .bmp file, which consists of the ellipse based on equation from assignment. When viewed through an image viewer, the ellipse can be seen.

