

COSC 4370 – Homework 1

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I Problem

The assignment requires the rasterization of an ellipse, in white, of the equation:

$$(x/16)^2 + (y/8)^2 = 45$$

as well as a semi circle, in red, on the positive x of the ellipse, all done on a black background. The radius of the circle, based on the ellipse, is $r=4*\sqrt{45}$.

II Method

To make the code easier to implement, I still used the concept of symmetry, but just iterated left to right (-a to a), calculating the corresponding y element and setting a pixel at that location. For the red semicircle, it was the same code, but iterating from 0 to a, with the equation for a circle used with radius calculated with the shorter side of the ellipse to fit inside.

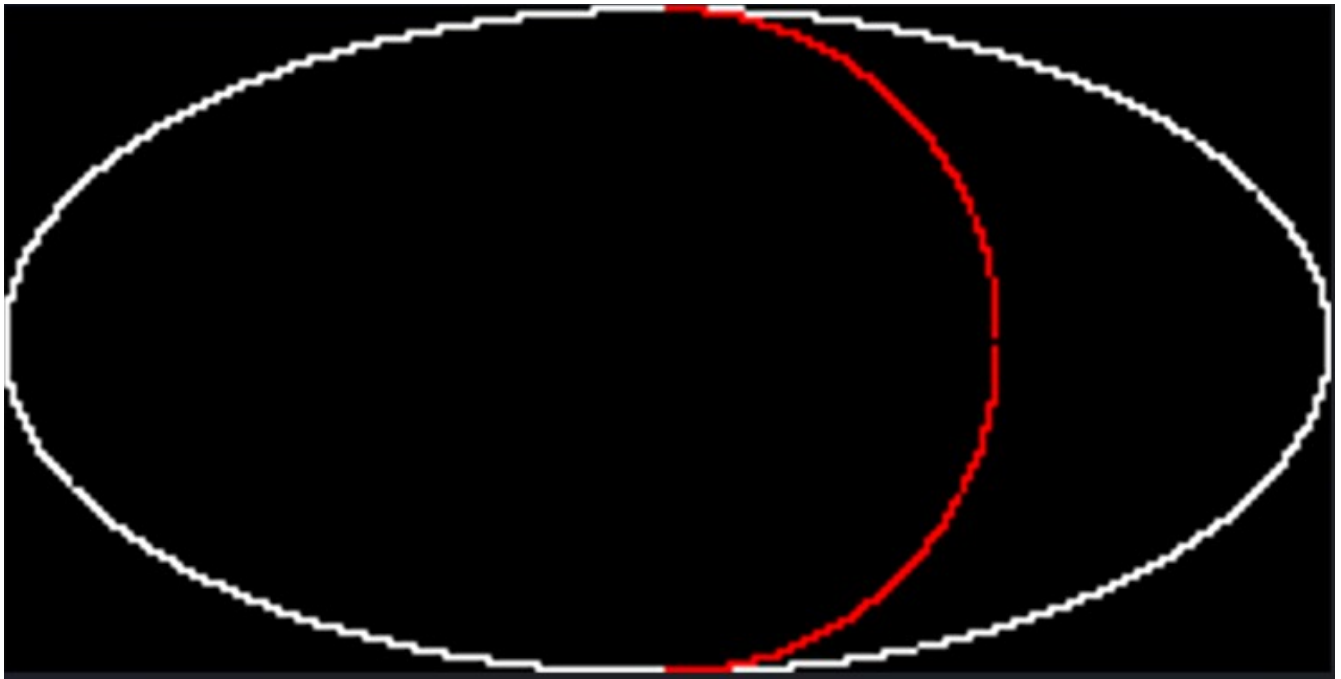
III Implementation

To create a pixel at each point, a for loop along the entire length of ellipse can calculate both sides. To do this, first the x- and y-length must be derived from the formula, which works out to x-length= $2*16*\sqrt{45}$, and $2*8*\sqrt{45}$. We run a for-loop from -a to a (x-axis) calculating at each point the positive and negative y value and after that calculation, assign a pixel at that location. For granularity, the increment ($x+=0.01$) can be adjusted to increase smoothness, match a display's resolution, etc. as well as increasing the size of the ellipse.

The semi-circle is calculated using something very similar, iterating instead from 0 to a, using the smaller length as the radius in order to fit it inside the ellipse.

IV Results

The output was a .bmp file which when viewed shows the white ellipse on a black background and the red semicircle drawn to the positive x half of the ellipse.



The jaggies are due to the relatively small size of the ellipse which can be smoothed out by increasing the size. Here is the equation scaled up to $a=400$, $b=200$:

