COSC 4370 Homework 1

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Assignment Problem:

Derive an algorithm that rasterizes the half of the circle $x^2 + y^2 = 100^2$ when $x \geq 0$ and the half of the circle $x^2 + y^2 = 150^2$ when $y \geq 0$.

Algorithms and Implementation:

The algorithm I used was a modified version of the midpoint circle scan conversion algorithm provided in the reading that determines the x and y position of both the circles from $(0, y)$ to $(R/\sqrt{2}, (R/\sqrt{2})$. This is achieved by using different variables to hold the x, y, and d of each circle, each following the midpoint circle scan conversion algorithm's steps to determine which pixels while be lit. The midpoint circle scan conversion works by using the variable d to determine which pixel will be lit. If $d \leq 0$ then the pixel to the east is lit, otherwise the pixel to the southeast is lit. Then the function updates d based on the pixel chosen and this is repeated until y > x. The algorithm ends with the x and y coordinates of both circles being passed to the renderPixel function.

The renderPixel function that been modified to take four inputs which are the x and y coordinates for the half-circle with a radius of 150 and the x and y coordinates for the half-circle with radius of 100. This function takes advantage of the eight symmetrical points on a circle to generate the half circles specified in the problem.

Results:

The output below is from running the program with a radius of 150 in the command line.
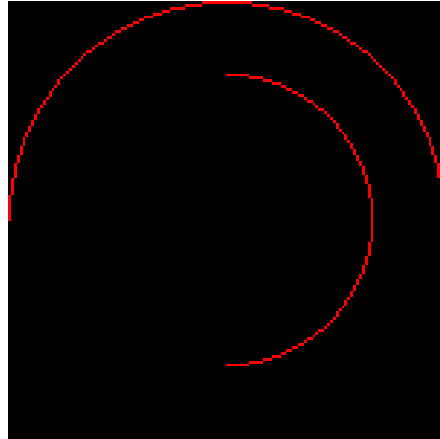
The output achieved creates both half circles correctly with the half circle with a radius of 150 being rasterized where $y \geq 0$, and the half circle with a radius of 100 being rasterized where $x \geq 0$.