Programming Assignment #3
RANSAC

Due: November 4

For this assignment you will implement RANSAC for finding lines and circles in binary images. Please turn in the solutions for the problems below together with a printed copy of your source code and an explanation of the choices you made. You can look up the answers for Problem 5 and 7 (specify the source). The other problems you should solve on your own.

Finding Lines

A line is defined by three parameters (a, b, c) such that the points in the line satisfy $ax + by + c = 0$.

Problem 1 Let $p_1 = (x_1, y_1)$ and $p_2 = (x_2, y_2)$ be two different points. What is the equation for the line that goes through p_1 and p_2?

Problem 2 Let $p = (x, y)$ be a point. What is the distance from p to its closest point on the line defined by parameters (a, b, c)?

Problem 3 Write a function that draws a line (a, b, c) in an image. Make sure your function can draw lines in any orientation (including horizontal and vertical) without leaving holes.

Problem 4 Write a program that finds lines in a binary image using RANSAC. The program should generate an output image by drawing the lines that are found. You should run it on the test images provided in the class website and submit the results with your writeup.

Finding Circles

A circle is defined by three parameters (a, b, c) such that the points in the circle satisfy the equation $(x - a)^2 + (y - b)^2 = c^2$.

Problem 5   What is the equation for a circle tha goes through three points?

Problem 6   Let $p = (x, y)$ be a point, what is the distance from p to its closest point on the circle defined by parameters (a, b, c)?

Problem 7   Write a function that draws a circle.

Problem 8   Write a program that finds circles in a binary image using RANSAC. The program should generate an output by drawing the circles that are found. You should run it on the test images provided and submit the results with your writeup.