Given a set of discrete 2-D sample data points is a text file named "data1.txt". Your tasks are to

1. Find the best line fit to these points
2. Quantify the error associated with the fit in (1).

Given a set of discrete 2-D sample data points is a text file named "data2.txt". Your tasks are to

1. Find the best fit to these points
2. Quantify the error associated with the fit in (1).

A sensor on a stationary robot at an unknown position generated the x-y position data in "data3.txt". Your goal is to

1. Estimate the position of the robot
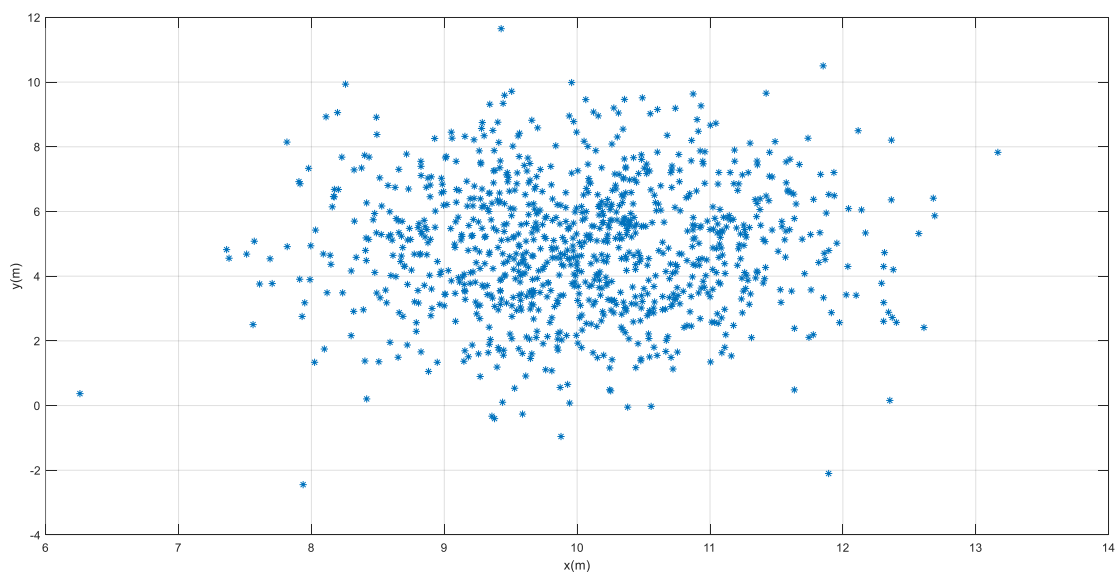2. Quantify the uncertainty associated with this position estimate.

Figure 1 Plot of data in "data3.txt".

Suppose you have two ultrasonic sensors measuring distance to a particular surface, where sensor A reads 60±5 cm and sensor B reads 67±3 cm.

1. What is the range of possible distance estimate considering the two sensors?
2. Is combining the two sensors better than using any one of the two sensors? If yes, why?

Write a function that generates white noise contaminated position data from a train traveling at a constant velocity. The noise standard deviation is 1m and time resolution is 0.01s. Simulate the train for 20 seconds and present the results in a graph.

Note: Assume normal distribution for all tasks.