Assignment 6 - (30 points)

Your assignment for Monday, October 27th, is to implement routines necessary to maintain an estimate of the state of a rover as it traverses a 2D environment. Information will be provided in the form of sensor observations of the rover's position or control inputs defining the motion of the rover. Specifically, I will provide a text file with information in the following format:

Each line of data will begin with an integer defining the type of information that follows. A value of '0' indicates that what follows is a control input commanding the rover to move. Each control input consists of:

- Two real values giving the rover's relative change of position. These two values represent a vector that can be added to your mean estimate to reflect the rover's change of position.
- Upper triangular elements (in row order) of the square root of the motion covariance matrix. This gives the amount of position uncertainty introduced by the rover's movement.

Example:

0 29.499923 38.399449 9.399002 -2.290300 4.0402098

A nonzero value d indicates that what follows is an observation of the position of the rover, with d being the dimensionality of the observation. Each observation will consist of:

- The d observation values (real)
- The upper triangular elements (row order) of the square root of observation covariance matrix
- The elements of the transformation matrix H (row order) from rover to sensor coordinates

Example:

2 29.499923 38.399449 9.399002 -2.290300 4.0402098 -0.089400 2.203045 23.393942 64.393944

The rover's initial position will be defined as the origin of a 2D Cartesian coordinate system and thus will have no positional uncertainty. Your submission should include the following:

1. A single plot of the normalized innovations.
2. A single plot of the square root of the trace of the rover covariance matrix.
3. A plot showing the rover's path based on your position estimates after each control input. Zoom in on the final position at different magnifications to see the rover's maneuvers.
4. Print the percentage of observations for which the innovation size was less than 1.
5. Print the final position estimate of the rover and the estimated standard deviation of the error associated with each coordinate.