Project 2
Due July 13 2022

Develop an Extended Kalman Filter for the following system:

We have an object that is moving in two directions (x and y) with constant velocity (vx, vy) and with a constant turn rate (rate is constant).

We have two sources of measurement:

1. A LIDAR sensor that measures the position of the object in (x, y) co-ordinates with some noise
2. A RADAR that measures the position, relative velocity and heading angle (r, rdot, heading) with some noise

Develop an extended Kalman filter to predict the position (x, y) velocity (vx, vy), yaw and yaw rate of the object. Use python or MATLAB

Data for measurements is given in the attached file. It follows the following format

L -> LIDAR sensor
X position
Y position
Time
Ground truth X position
Ground truth Y position
Ground truth vx
Ground truth vy
Ground truth yaw
Ground truth yaw rate

R-> RADAR sensor
Distance (r)
Heading (heading)
Relative Velocity (rdot)
Time
Ground truth X position
Ground truth Y position
Ground truth vx
Ground truth vy
Ground truth yaw
Ground truth yaw rate

Output the following

time
x_state
y_state
vx_state
vy_state
yaw_angle_state
yaw_rate_state
sensor_type
x_measured
y_measured
x_ground_truth
y_ground_truth
x_ground_truth
y_ground_truth

as well as plot the esimtated position (x, y) vs ground truth position (x, y)