Homework #5
AE6505 Kalman Filtering, Spring 2022
Prof. Gunter
Assigned: 3-29-22
Due: 4-15-22 (4-18-22 for DL Students)

Homework is due by 11:59p on the indicated due date, and should be submitted electronically via Canvas. Late homework will not be accepted without prior permission from the instructor. In-class verbal due date announcements override projected dates in the lecture plan. Please submit your materials as two files. The first should be a writeup of your solutions, complete with any figures, explanations, etc., in .pdf form. This is the document that will be graded, i.e., do not embed solutions in your code, or require the grader to run your code to get any results. Homework should be professional, legible, indicate units, and sufficiently describe all important steps in a solution. Your final answer for each problem should be boxed or clearly indicated. You are welcome to scan any pages that are handwritten, but please make sure any such pages are clear and legible. Deductions will be made for incomplete solutions and improper formats. In addition to the .pdf file, upload any Matlab files that you have developed to generate the results described in your writeup as a single .zip file. The Matlab code you submit should be able to be run without modification, so do not include hardcoded file paths.

1. Exercises 13.7, 13.17, 14.14 and 15.15 from the text by Simon.

2. Using the same dynamics, measurement models, and data set from HW4 Question 2, now process the trajectory of the baseball using 1) an Extended Kalman Filter, 2) an Unscented Kalman Filter, and 3) a particle filter. Use the same measurement uncertainties and state *apriori* information as before. Compare all of the various estimation approaches (batch, KF, EKF, UKF, PF) with each other with visualizations and numerical results. Which method performs best?