Examination #1, **AOE 5984, Model-Based Estimation & Kalman Filtering.** Fall 2024

Exam rules: Do all problems. Hand in completed exam by 8 a.m. on Tuesday Oct. 22, 2024 via Canvas if enrolled in the on-line section or as a hard copy to Prof. Psiaki in class if enrolled in the in-class section. No collaboration or consultation is allowed with any other humans except Prof. Psiaki. He is willing to talk about problems if available. You may use (inanimate) outside sources (e.g. books). If you use such sources, then list them.

[15 pts] Assignment 1, Number 9

[20 pts] Assignment 3, Number 7 parts a) and b), except use the covariance matrix

$$P = \begin{bmatrix} 1 & 0.5 \\ 0.5 & 2 \end{bmatrix}$$

in these two parts of the problem. Recalculate results and make new plots based on this new covariance matrix. This will involve re-doing a number of the numerical calculations of the original problem in Bar-Shalom. Be sure to hand in your acquisition test statistic's formula, its threshold value, and its probability density functions, all with numerical values included where appropriate.

[15 pts] Assignment 2, Number 4, except add 0.25 to each element of $\underline{z}$ and add 1.2 multiplied by the identity matrix to R before solving the problem.

[15 pts] Problem 2-7 in Bar-Shalom.

[20 pts] Assignment 3, Number 6.

[15 pts] Problem 3-13 in Bar-Shalom.