# Prelab 3 for AAE364L Fall 2020

September 12, 2020

The lab manual for this experiment (lab 3) can be found at:

`https://engineering.purdue.edu/AAECourses/aae364L/Spring-2015`

The lab manual will have helpful information in completing your prelab. The simulink files can also be found at the above link. The simulink files you will need to complete the prelab are described in the lab manual in the appropriate section.

## 1 Pre-Lab to balance the pendulum (Part (ii) in the manual). Due at the beginning of the lab experiment. You will not be allowed to run the lab experiment with out a complete pre-lab.

i. Hand in the values of the feedback gains K (from pole placement and LQR) that you obtained using Simulink to balance the **medium** inverted pendulum. You will be given no credit for using the state feedback gain K in (1.6) or (1.8) of the lab manual.

ii. Hand in the plots of the poles of the feedback system with **pole placement** and **LQR** method. Put them on separate plots, but with the same scale, same range, same position of origin.

iii. Hand in the plots for the angle $\alpha$ for **both gains K** that you used in Simulink on the same graph. Hand in the plots for the position $x_c$ for the both gains K that you used in Simulink on the same graph.

**NOTE: Make sure to set the pendulum type in the matlab files to PEND_TYPE = 'MEDIUM_12IN'**

You CANNOT use gains that have a magnitude greater than 200, i.e. $\mid k_x \mid \leq 200$ for $x = 1, 2, 3, 4$