Lab 4, SFWR ENG 3DX4
Introduction to PD Compensator Design and Electromechanical Control
PRELAB EXCERCISES

Prelabs due the week of: Mar. 18th, 2024

1. Short Answer Problems [25]:

   (a) What does a root locus plot depict? [5]

   (b) What must be done to a transfer function before its root locus can be graphed? [5]

   (c) What is the significance of the gain K? [5]

   (d) How can a root locus plot be used to design a controller? [5]

   (e) Imagine we have a partially finished root locus plot where only the pole and zero locations have been plotted. What are the rules for completing the root locus plot using pencil and paper? (Hint! Your textbook has this information!) [5]

2. Graphing Problems: For each of the following transfer functions, sketch a root locus plot using the pencil-and-paper method you outlined above. [15]
   WARNING: Sketching root locus plots can be counter-intuitive! Follow the steps carefully!

   (a) $G(s) = \frac{1}{(s+5)(s+9)}$ [5]

   (b) $G(s) = \frac{(s-4)(s-7)}{(s+2)(s+5)(s+12)}$ [5]

   (c) $G(s) = \frac{(s+7)}{(s+8)(s+9)(s+3)^2}$ [5]