EE 3657
Homework # 5 – Assigned Fri Jul 5 - Due Tu July 9

Covers Root Locus. Your notes and the textbook should be ample material to solve these problems.

1. The control of a satellite's attitude is described by the simple equation: $G(s)=\frac{1}{s^2}$. Use the root locus plotting rules to sketch the rough root locus for a unity feedback system with feedforward transfer function (a) $G(s)=\frac{K}{s^2}$, (b) $G(s)=\frac{K(s+1)}{s^2}$, (c) $G(s)=\frac{K(s+1)}{s^2(s+12)}$, (d) $G(s)=\frac{K(s+1)}{s^2(s+4)}$, and (e) $G(s)=\frac{K(s+1)}{s^2(s+9)}$. Also use MATLAB to plot the root locus for these transfer functions. Comment on the relationship of the change in root-locus shape to the addition of the zero in (b) and the addition of the poles in various locations in (c)-(e) to the transfer function given in (a).

2. For a time-delay unity feedback system with feedforward transfer function given by $G(s)=K\frac{2}{100s+1}e^{-4s}$, find the stability range for gain K.

3. Plot root-locus diagrams for the following non-minimum phase systems: (a) $G(s)=\frac{K(s-1)}{(s+2)(s+4)}$, and (b) $G(s)=\frac{K(1-s)}{(s+2)(s+4)}$.