ECEN315
Assignment 3
Root Locus

Show working for all your calculations please

1. Sketch the root locus for the following systems, be sure to include real axis intercept and angle of any asymptotes on the sketch. You are more than welcome to check your answers with matlab (rlocus()) , but it is a good idea to attempt the solution by hand first.   (20 marks)

$$G_{(s)} = \frac{1}{s^3 + 2s^2 + 5s}$$

$$G_{(s)} = \frac{s^2 + 4s + 8}{s^2 + 5s + 4}$$

$$G_{(s)} = \frac{4}{(s + 2)(s + 5)(s + 6)(s + 9)}$$

2. For the following systems, sketch the root locus diagrams and where appropriate include the system's asymptotes (show calculations). Then calculate the break-away/in points for the root locus and the imaginary axis intercepts for the systems. (20 marks)

$$G_{(s)} = \frac{(s - 2)(s - 6)}{(s + 1)(s + 4)}$$

$$G_{(s)} = \frac{s^2 - 2s + 5}{s^2 + 3s + 2}$$

3. For the following system, calculate the angle of departure for the complex roots. (10 marks)

$$G_{(s)} = \frac{(s + 2)}{(s^2 + 4s + 8)(s + 1)}$$