Given: The following transfer functions for \( G(s) \) and \( H(s) \) sketch the root locus. Then, were applicable find:

a. The break away/in points.
b. Using the magnitude criterion, find the gain at the break away/in points.
c. Find the angle of departure/arrival from/to the complex poles/zeros using the angle criterion.
d. Using the angle and magnitude criteria, find the where the root locus crosses the \( j\omega \)-axis and the gain at that point.
e. Find the location and gain for a percent overshoot of 4.32 % assuming the dominant second order poles are indeed dominant (ie: nice equations apply) using the angle and magnitude criteria.
f. Verify our findings in with the root locus plot in Matlab.

1. \( G(s) = \frac{(s + 3)}{s(s^2 + 4s + 4)(s + 5)} \), \( H(s) = \frac{1}{s + 6} \)
2. \( G(s) = \frac{1}{s(s + 2)(s + 4)} \), \( H(s) = \frac{1}{s + 10} \)
3. \( G(s) = \frac{(s^2 + 2s + 8)}{s(s + 5)} \), \( H(s) = \frac{1}{s + 10} \)
4. \( G(s) = \frac{1}{s^2(s + 2.5)(s^2 + 2s + 2)} \), \( H(s) = (s + 10) \)