



- d. On your pole/zero map, draw the root locus of the system. (3 points)
- e. What will be the location of the closed-loop poles for 30% overshoot? Give the pole locations specifically, i.e. not just on the picture.  $s = ?$  (2 points)
- f. What is the value of  $K_p$  for 30% overshoot? (4 points)
- g. What would happen to the root locus of your system if you were to put an open-loop zero into the system halfway between the two open-loop poles ( $s+1.5$ )? Draw the new root locus below. (3 points)

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- h. For this system, what would its behavior be to a step input? Comment on its steady-state error, its stability, and its oscillatory characteristics for all values of  $K_p$ . (3 points)
- i. If in g above,  $K_p = 2$ , what kind of controller would you have added and what would its gains be? (3 points)