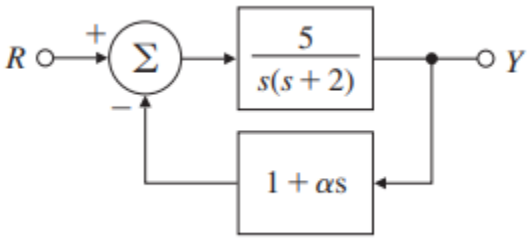
ECE 141, Spring 2022
Homework 6

5.9 Put the characteristic equation of the system shown in Fig. 5.45 in root-locus form with respect to the parameter α, and identify the corresponding $L(s)$, $a(s)$, and $b(s)$. Sketch the root locus with respect to the parameter α, estimate the closed-loop pole locations, and sketch the corresponding step responses when $\alpha = 0, 0.5$, and 2. Use Matlab to check the accuracy of your approximate step responses.

Figure 5.45
Control system for Problem 5.9



5.13 For the system in Fig. 5.47,

(a) Find the locus of closed-loop roots with respect to K.

(b) Is there a value of K that will cause all roots to have a damping ratio greater than 0.5?

(c) Find the values of K that yield closed-loop poles with the damping ratio $\zeta = 0.707$.

(d) Use Matlab to plot the response of the resulting design to a reference step.

Figure 5.47
Feedback system for Problem 5.13