UC Berkeley

EE128 Homework #3

Due on 10/7/05

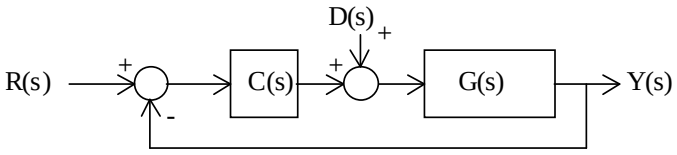
(1) Textbook problem 4.18

(2) Use Simulink to show that, with a K value within the range found in Problem 4.18 part (b) (use a value that is near the middle point of the range), the system is capable of tracking a sinusoidal reference with zero steady state error.

(3) Textbook problem 4.24.

(4) Textbook problem 4.25 (a) and (b).

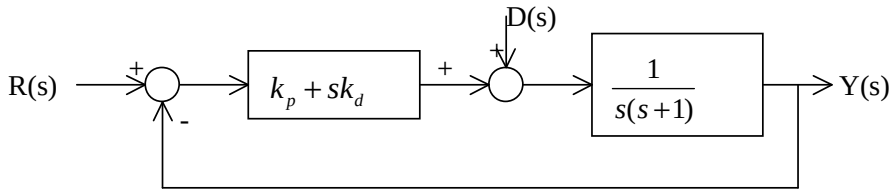
(5) Is a type K system w.r.t to input must also of type K w.r.t. disturbance? Is a type K system w.r.t to disturbance must also of type K w.r.t. input? Consider the following block diagram, under what condition (on poles and/or zeros of C(s) and G(s)), both statements are true?



(6) The following figure shows a PD controller.

(6a) Show that the system is stable for all positive value of k_p and k_d.

(6.b) Show that if the derivative term (sk_d) is replaced by the modified form : $\frac{s}{0.1s+1}k_d$ (a.k.a, pseudo differentiator), the system becomes unstable for a large value of k_p.



(7) Textbook problem 5.4 (b) and (c). No need to determine arrival and departure angle or axis crossing frequency.

(8) Textbook problem 5.7 (a) and (b). No need to determine arrival and departure angle or axis crossing frequency.