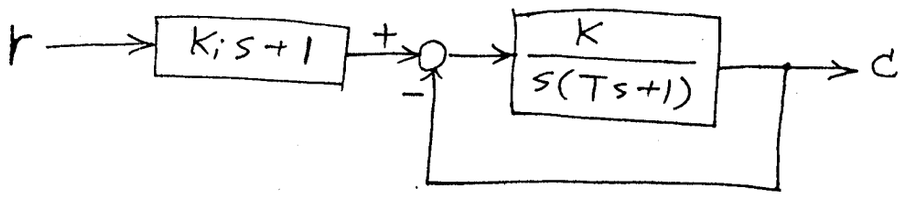
1. Obtain the unit-step response of a unity-feedback system (20%) whose open-loop transfer function is

$$G_T(s) = \frac{5(s+20)}{s(s+4.59)(s^2+3.415+16.35)}.$$

2. (20%) Consider the system shown below



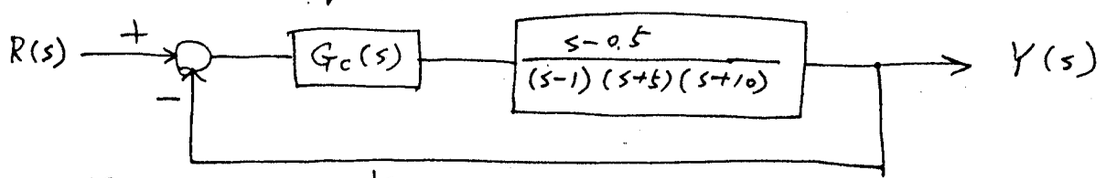
Assume that the input is a ramp input, or

$$r(t) = at$$

where a is an arbitrary constant.

Show that by properly adjusting the value of K_i, the steady-state error in the response to ramp inputs can be made zero.

3. Consider the system shown below



Suppose $G_c(s) = \frac{K}{s-0.5}$. The system is asymptotically stable if $50 < K < 540$.

(13%) (a) Sketch the root locus for positive K labeling all asymptotes, break points, and imaginary axis crossings.

(7%) (b) In practice, the poles and zeros of a plant are not known exactly. How is the stability of the closed-loop system affected if the plant zero is actually 0.501? Support your answer.

(背面仍有題目,請繼續作答)

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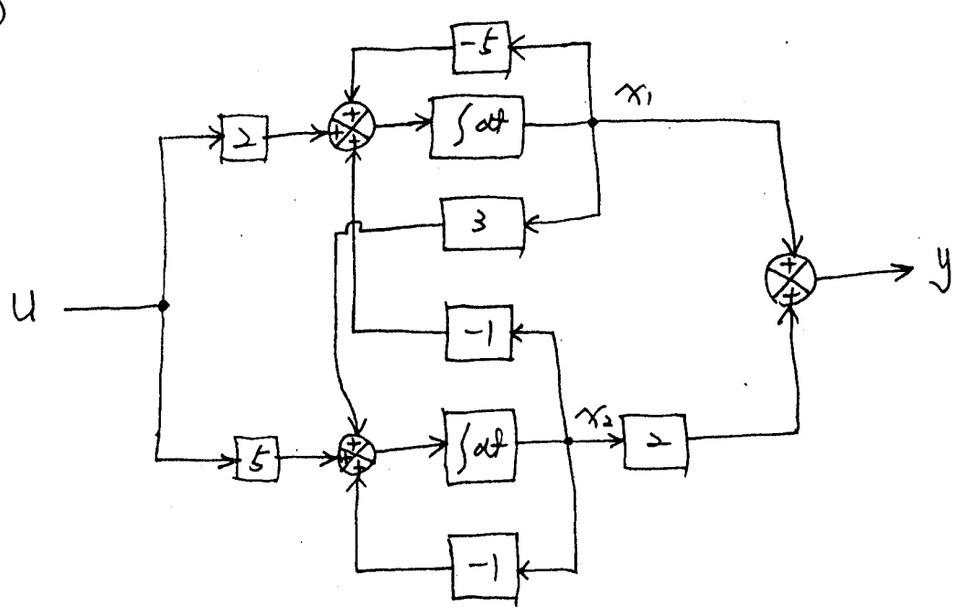
4. Obtain the transfer function of the system shown below (20%)



5. The asymptotic bode plots for a system are sketched below. (20%) Find the open loop transfer function, G(s), of the system.