Automatic Control Systems

Sheet (8)

Routh Stability

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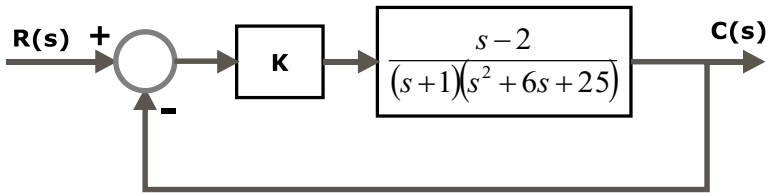
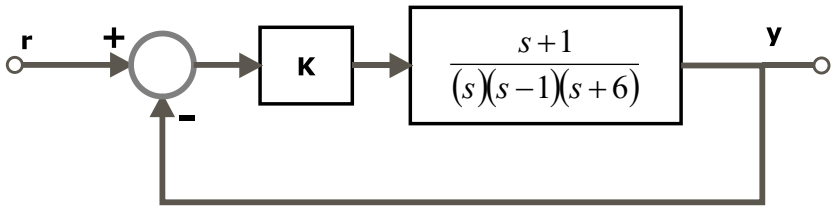
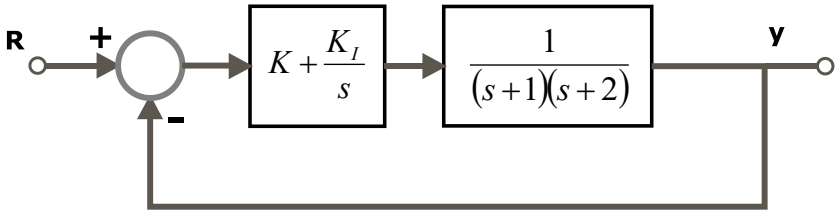
1. Determine the range of K for stability of a unity-feedback control system whose open loop transfer function is $G(s) = \frac{K}{s(s+1)(s+2)}$
2. Consider the following characteristic equation:
$$s^4 + 2s^3 + (4+K)s^2 + 9s + 25 = 0$$
Using Routh stability criterion, determine the range of K for stability
3. Consider the closed-loop system shown in fig. below. Determine the range of K for stability, assume that $K > 0$



4. Consider the closed-loop system shown in fig. below. Determine the range of K for stability, assume that $K > 0$



5. Find the range of the controller gains (K, K_I) so that the PI (proportional-Integral) feedback system in fig, below is stable



6. Consider the following characteristic equation:
$$a(s) = s^5 + 3s^4 + 2s^3 + 6s^2 + 6s + 9$$
Determine whether any of the roots are in RHP
7. For the polynomial
$$a(s) = s^5 + 5s^4 + 11s^3 + 23s^2 + 28s + 12$$
Determine whether there are any roots on the $J\omega$ axis or in the RHP
8. Find the range of K for which all the roots of the following polynomial are in LHP:
$$s^5 + 5s^4 + 10s^3 + 10s^2 + 5s + K = 0$$