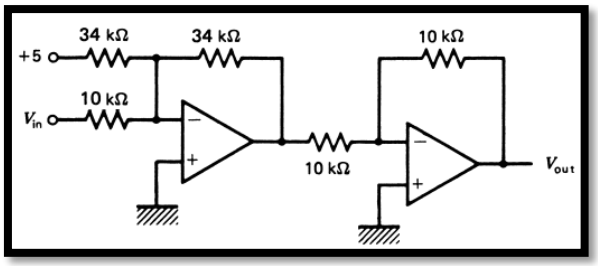
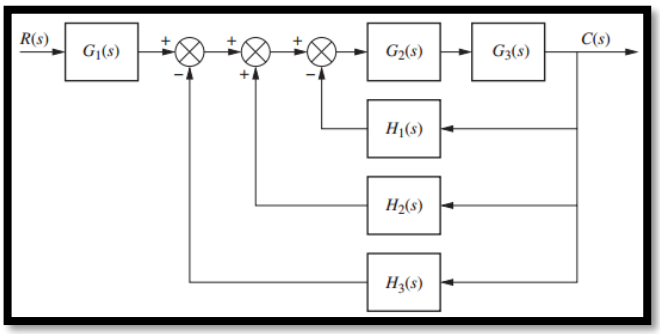
Question 01 [20 Points]

A. Obtain the output equation of $\boldsymbol{V_{out}}$ for the circuit below



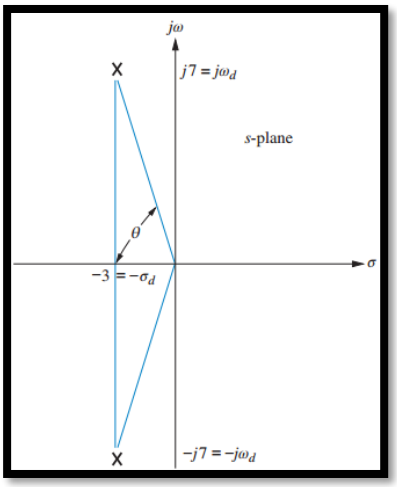
B. Use Block diagram reduction to find transfer function $\frac{\boldsymbol{Y(s)}}{\boldsymbol{R(s)}}$



Question 02 [20 Points]

A. Given the pole plot shown next

Find ζ, ω_n, T_p, $\%OS$, and T_s



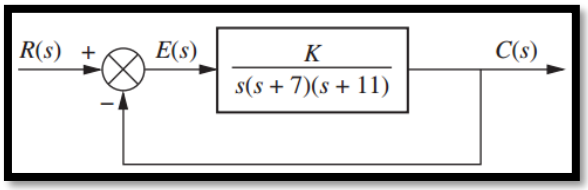
B. Find the steady-state error for the transfer function

$$T(s) = \frac{5}{s^2 + 7s + 10}$$

and the input is a unit step?

Question 03 [10 Points]

A. Find the range of gain, K, for the system of figure below that will cause the system to be stable



B. Once the system is found to be stable, it is of interest to determine **how stable it is**, and this degree of stability is a measure of **relative stability**, find the relative stability of the system that have the transfer function

$$\boldsymbol{T(s) = \frac{1}{s^2 + 5s + 6}}$$

BEST WISHES

Dr. Mostafa Elhosseini