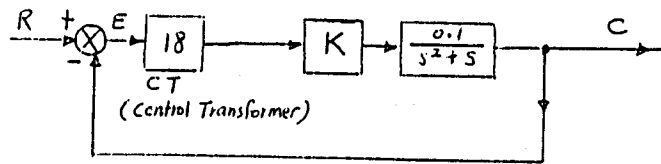
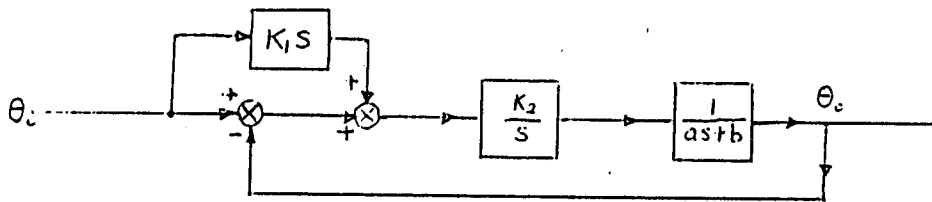


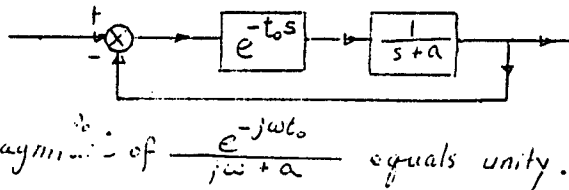
- Refer to the block diagram of a servo system shown below.
  - Find the value of  $K$  so that the undamped nature frequency  $\omega_n$  equals 25 rad/sec.
  - If a damping factor of 0.7 is desired, what should you do?



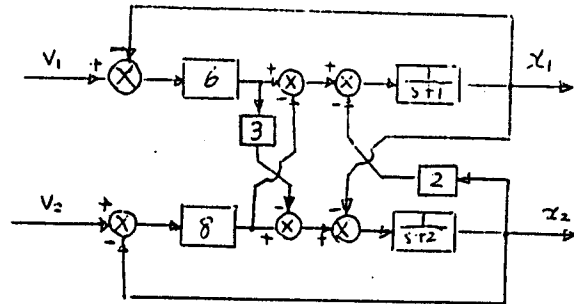
- Find the steady state error to a ramp input of the system shown below.



- For the time delay system shown right,  $a > 0$ . Determine the delay time  $t_0$  so that the phase margin is zero at  $\omega_0$  which is the frequency at which the magnitude of  $\frac{e^{-j\omega t_0}}{j\omega + a}$  equals unity.



- Obtain a state representation for the two-input-two-output system shown right.



- A linear system containing a nonlinear element (saturation) is shown below. If the input  $r(t)$  is a unit step, find the response  $x_1(t)$  by state variable method.

