

EE351 Homework 8

- 1) For each of the systems described by the following differential equation, find the system transfer function:

$$(D^3 + 5D^2 - 10D + 12)y(t) = (3D^2 + 2D + 10)x(t)$$

- 2) For a system with transfer function

$$H(s) = \frac{s + 5}{s^2 + 5s + 6}$$

Find the zero-state response for the following input:

- (a)  $x(t) = e^{-4t}u(t)$   
(b)  $x(t) = e^{-4(t-5)}u(t-5)$

- 3) Given the input  $x(t) = u(t)$ . Determine the output  $y(t)$  of the system shown in Fig.1.

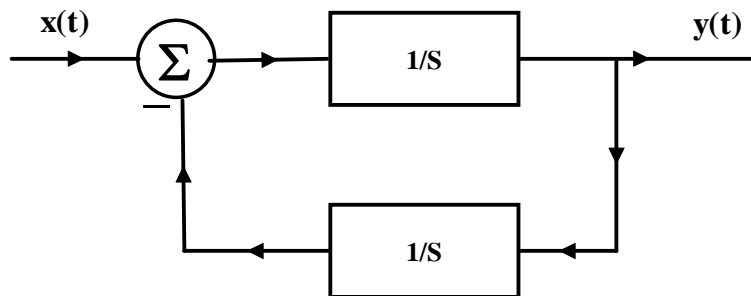


Fig. 1

- 4) Given the input  $x(t) = e^{-4t}u(t)$ . Determine the output  $y(t)$  for the system shown in Fig.2.

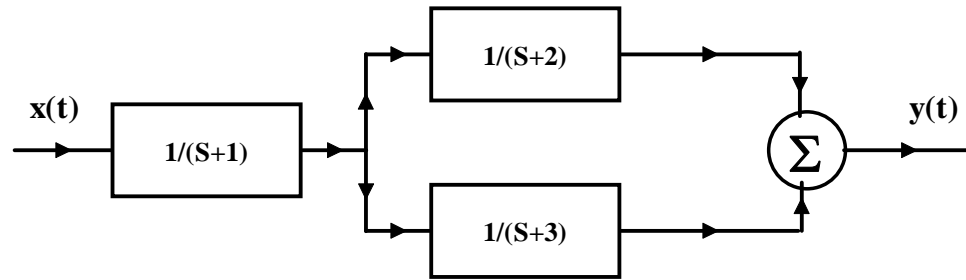


Fig. 2

- 5) The system function of an LTI system is given by

$$H(s) = \frac{s+1}{(s-2)(s+3)}$$

- If the system is stable, what is the ROC of  $H(s)$ ?
- If the system is causal, what is the ROC of  $H(s)$ ?
- If the system is NOT stable, determine all the possible regions of convergence.
- If the impulse response  $h(t)$  of the system is left-sided, what is the ROC of  $H(s)$ ?