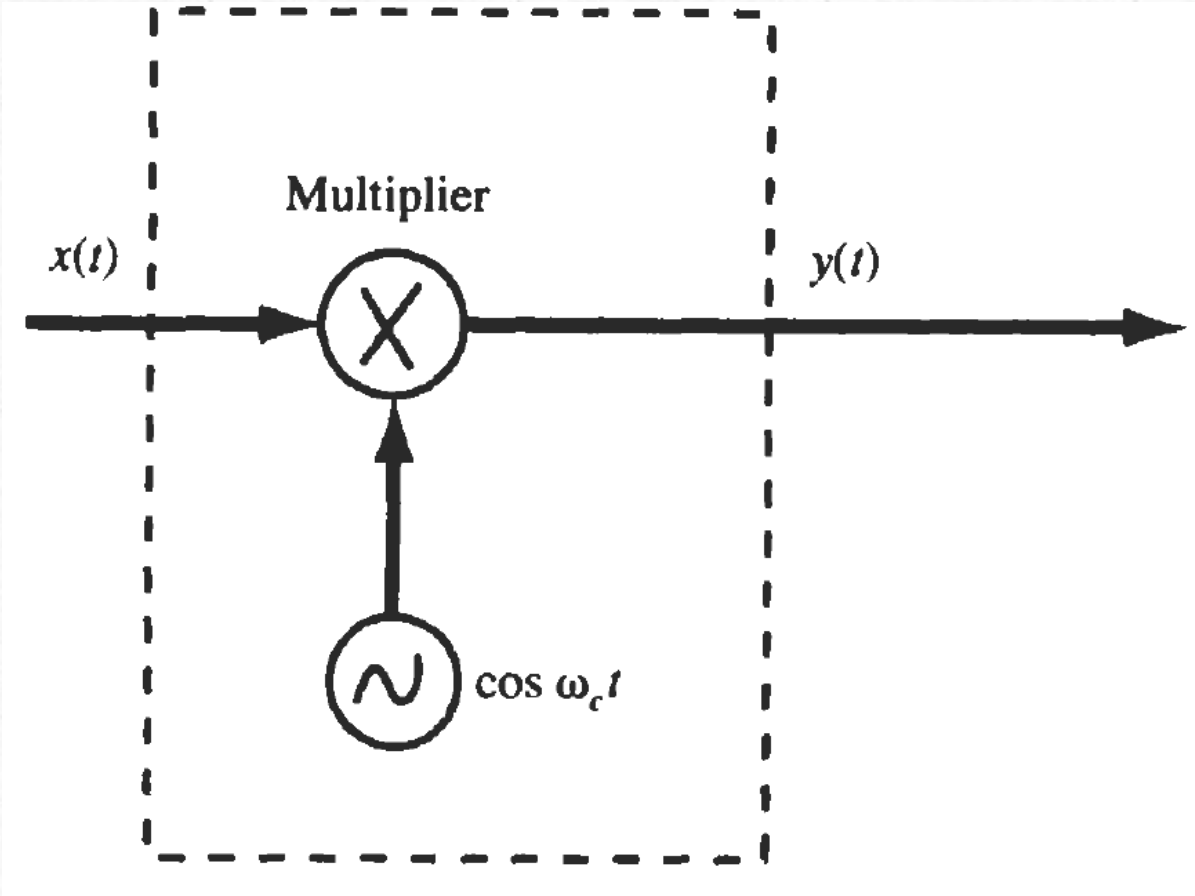
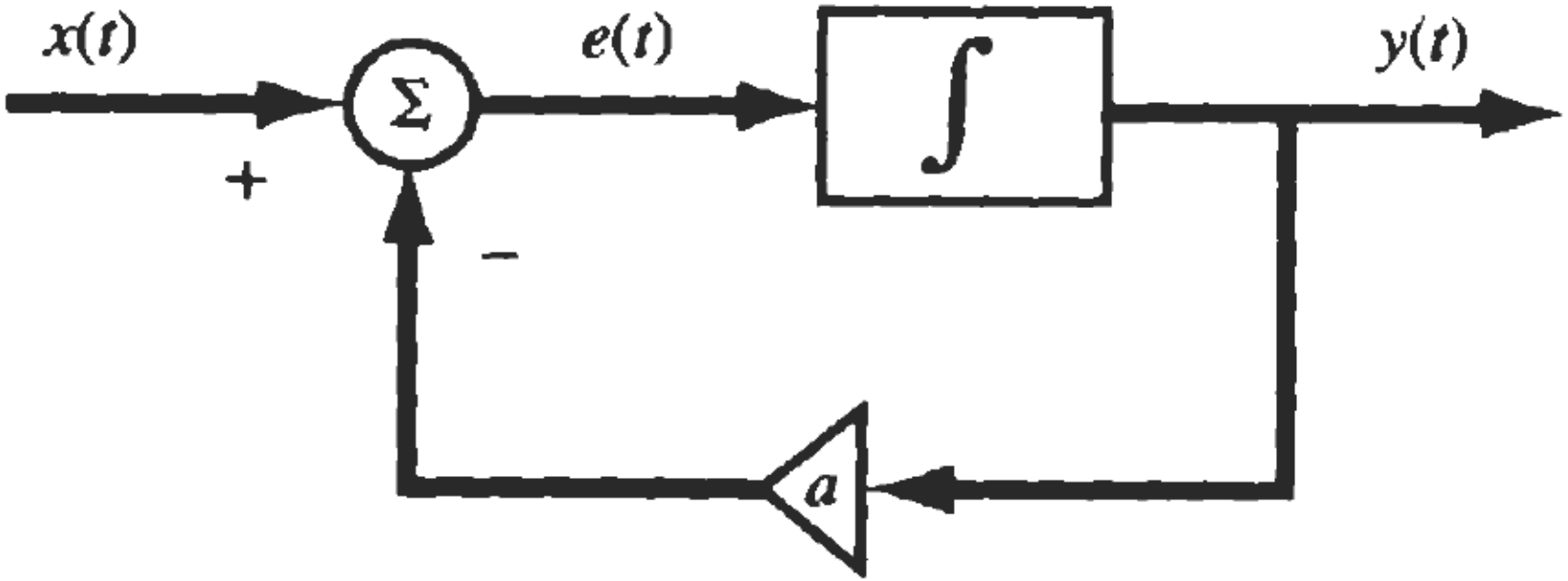
SYSTEM PROPERTIES
DIFFERENCE EQUATIONS
DIFFERENTIAL EQUATIONS
IMPULSE RESPONSE
CONVOLUTION

Consider the system shown. Determine whether it is :
1) memoryless 2) causal 3) linear 4) time invariant
5) stable



The continuous time system consists of one integrator and one scalar multiplier. Write differential equation that relates the input and the output.



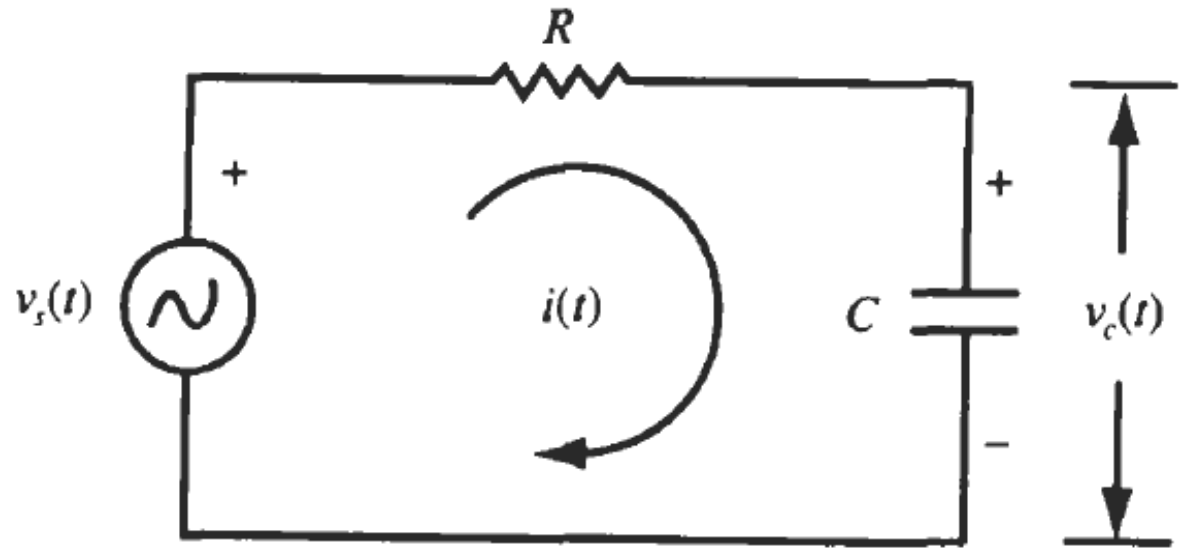
Draw the block diagram for the following difference equation.

$$y[n] = a_1 y[n-1] + a_2 y[n-2] + x[n]$$

Consider the RC circuit. Find the relationship between input and output :

(a) If $x(t) = v_s(t)$ and $y(t) = v_c(t)$.

(b) If $x(t) = v_s(t)$ and $y(t) = i(t)$.



impulse responses of the systems are given by $h_1(t)$ and $h_2(t)$, respectively, and

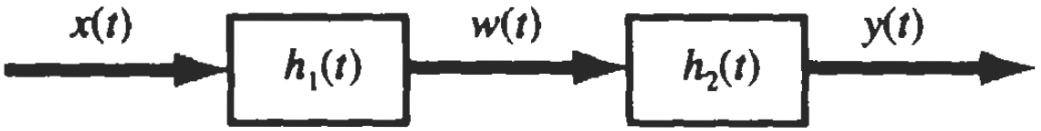
$$h_1(t) = e^{-2t}u(t) \qquad h_2(t) = 2e^{-t}u(t)$$

(*a*) Find the impulse response $h(t)$ of the overall system

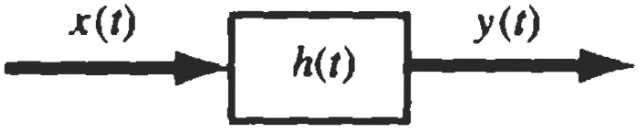
(*b*) Determine if the overall system is BIBO stable.

(a) Shows the system formed by cascading two systems

(b) shows overall system

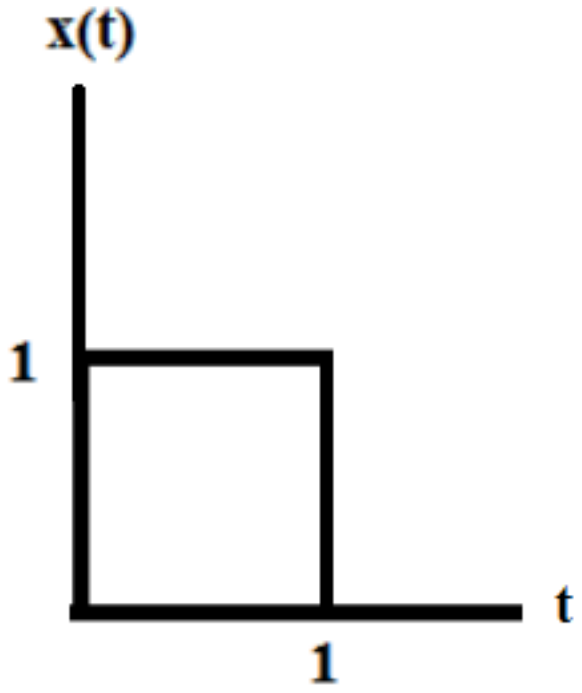


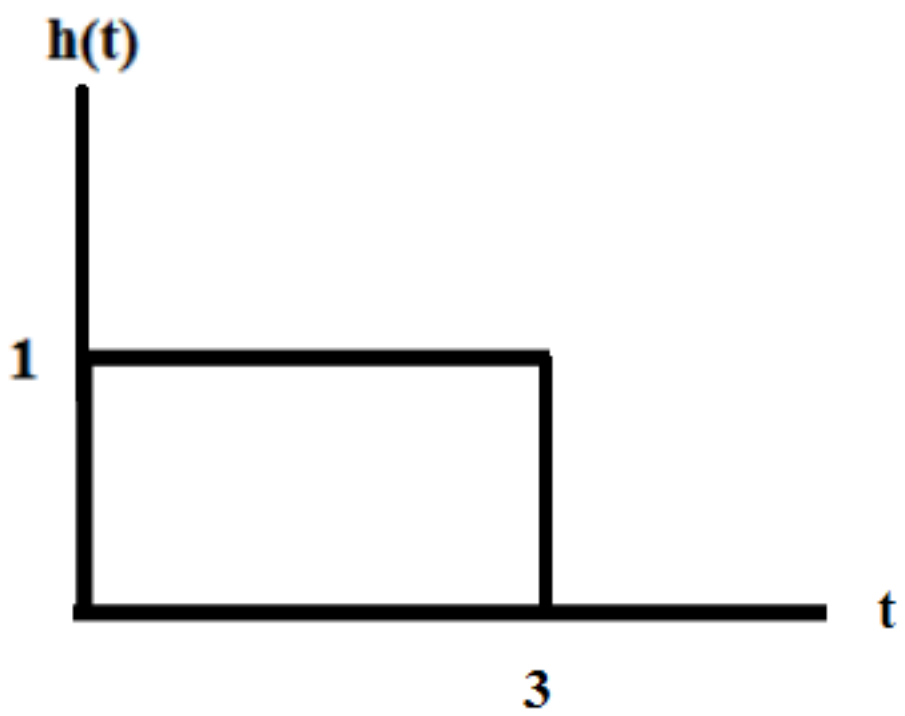
(*a*)



(*b*)

Convolve the following





Sketch and label the following

$(a)\ x(t)u(1-t);\ (b)\ x(t)[u(t)-u(t-1)];\ (c)\ x(t)\delta(t-\frac{3}{2})$