# Test 1

**Question 1 (25%)**

(a) Express the signal in Fig Q1(a) below, as addition/subtraction of unit step functions plus shifts.

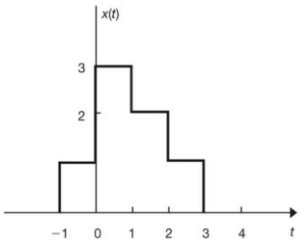



Fig. Q1(a)

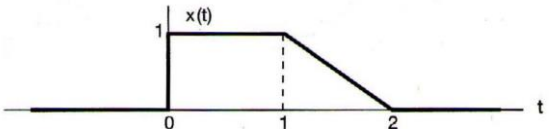


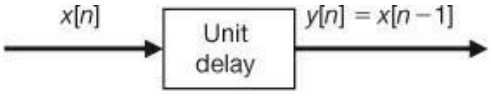

Fig. Q1(b)

(b) For the signal x(t) shown in Fig Q1(b), transform it into x(-t+1)

**Question 2 (25%)**

The discrete-time system shown in Fig. 1-36 is known as the unit delay element. Determine whether the system is:
(Answer yes/no for each part)

(a) memoryless,
(b) causal,
(c) time-invariant
(d) stable.




**Question 3 (25%)**

2.30. Evaluate y[n] = x[n] * h[n], by a graphical method (i.e. the quick method). x[n] and h[n] are shown in Fig. 2-23,

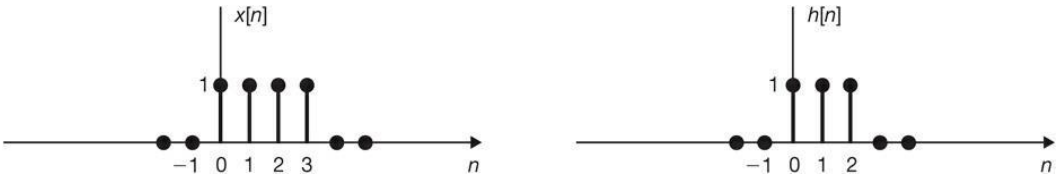
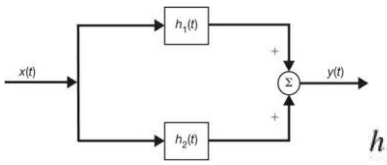



Fig. 2-23

**Question 4 (25%)**

(a) For the system shown in Fig. 2-31, find
   a. The overall impulse response h(t) of the system
   b. Is the system stable?




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

Fig 2-31

(b) Consider the system with impulse response as below. Find the input-output relationship.

$$h[n] = \begin{cases} 1 & n = 0, 1 \\ 0 & \text{otherwise} \end{cases}$$