

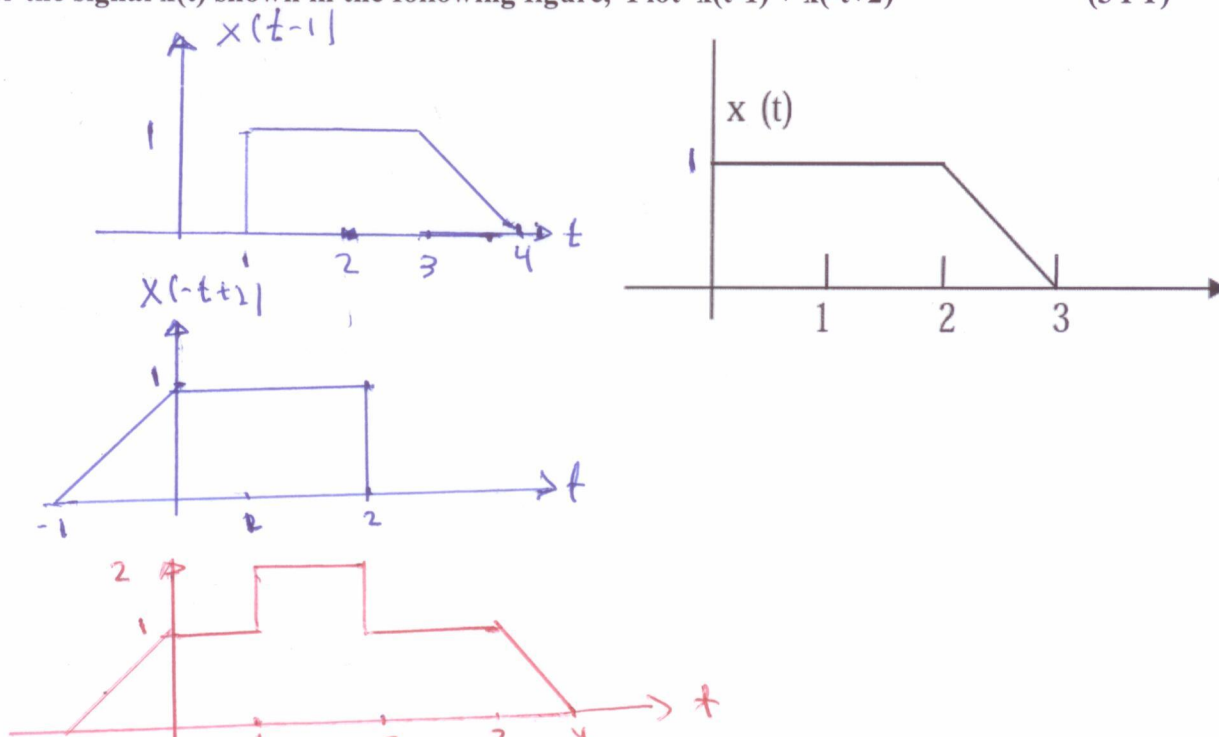
Islamic University of Gaza
Electrical Engineering Department
EELE 3310 Signals & Systems
Med-Term Exam
November 16, 2015



Dr. Basil Hamed
Name:

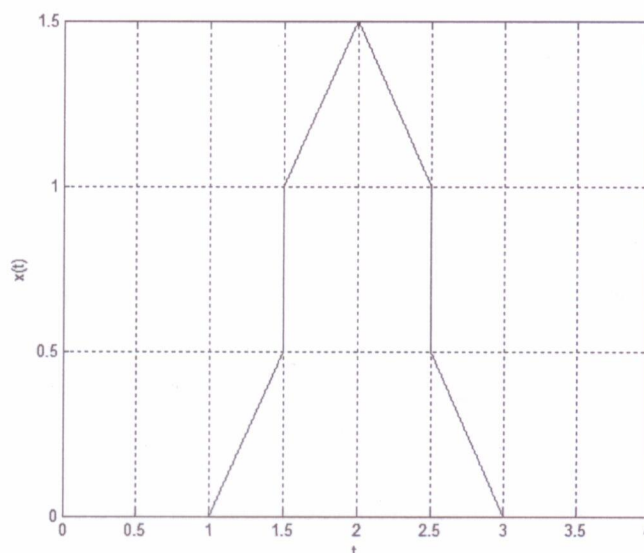
Exam Time 10:00-11:00
ID #

1. a) Consider the signal $x(t)$ shown in the following figure, Plot $x(t-1) + x(-t+2)$ (5 PT)



- b) Express the signal shown in the Fig in terms of unit step and unit ramp basic function (5 PT)

$$x(t) = r(t-1) + 0.5u(t+1.5) \\ - r(t-2) - 0.5u(t-2.5) \\ + r(t-3)$$

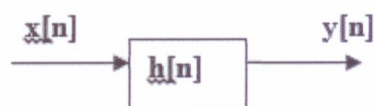


2. a) Find $y[n]$ for given $x[n]$, and $h[n]$.

(6 Pt)

$$x[n] = \{1, -1\}$$

$$h[n] = \{1, 5, 10, 11, 8, 4, 1\}$$

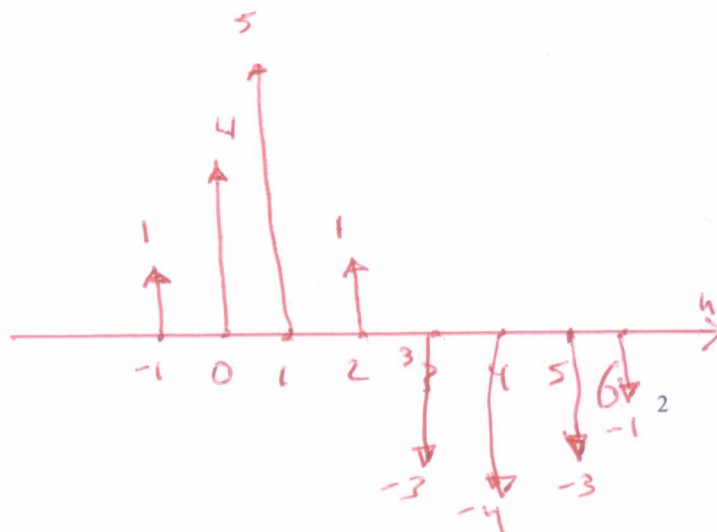
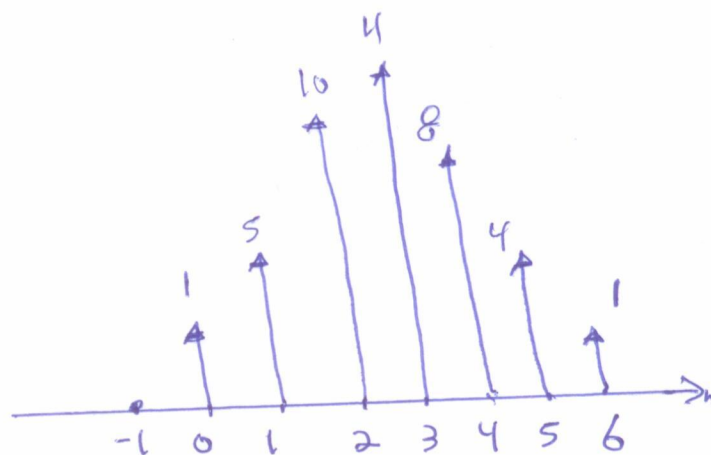
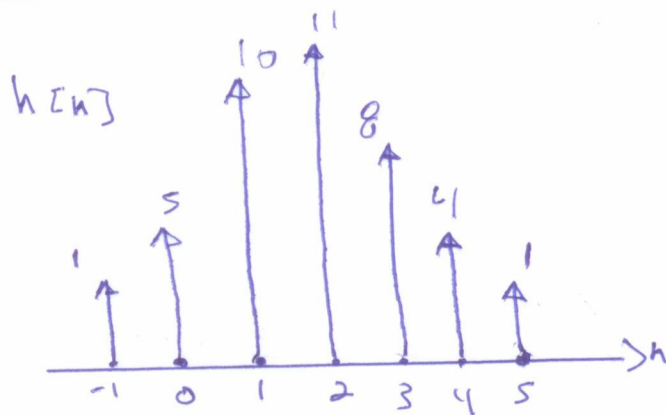


$$y[n] = x[n] * h[n]$$

$$x[n] = \delta[n] - \delta[n-1]$$

$$\therefore y[n] = h[n] - h[n-1]$$

$$y[n] = \{1, 4, 5, 1, -3, -4, -3, -1\}$$



- b) Consider the discrete-time system described by $y[n] = 2x[n] - 3x[n+1] + 5$ (6 PT)
- Is the system memoryless? Justify your answer
 - Is the system causal? Justify your answer
 - Is the system linear? Justify your answer
 - Is the system time invariant? Justify your answer

i) System is with memory because it is not instantaneous.

ii) System is not causal because it depends on future.

iii) $y_1[n] = 2x_1[n] - 3x_1[n+1] + 5$

$y_2[n] = 2x_2[n] - 3x_2[n+1] + 5$

$a y_1[n] + b y_2[n] = 2 [a x_1[n] + b x_2[n]] - 3 [a x_1[n+1] + b x_2[n+1]] + 5(a+b)$

$\therefore$ system is not linear because superposition does not hold.

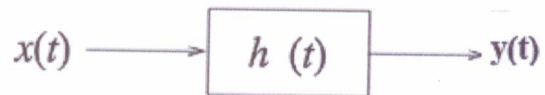
iv. System is TI because there is no multiplication of n .

3) Determine $y(t)$ where $x(t)$ and $h(t)$ is as shown in the figure below.

(8 Pt)

$$x(t) = e^{2t-3} u(t)$$

$$h(t) = u(t+2)$$



$$y(t) = x(t) * h(t) = \int_{-\infty}^{\infty} x(\tau) h(t-\tau) d\tau$$

$$y(t) = \int_{-\infty}^{\infty} e^{2\tau-3} u(\tau) u(t-\tau+2) d\tau$$

$$u(\tau) u(t-\tau+2) = 1$$

$$= 0$$

$$0 < \tau < t+2$$

otherwise

$$\boxed{-2 < t}$$

$$\therefore y(t) = \int_0^{t+2} e^{2\tau-3} d\tau = \left. \frac{e^{2\tau-3}}{2} \right|_0^{t+2}$$

$$y(t) = \frac{1}{2} [e^{2(t+2)-3} - e^{-3}] = \frac{1}{2} [e^{2t+1} - e^{-3}]$$

$$\boxed{-2 < t}$$

$$\therefore \boxed{y(t) = \frac{1}{2} [e^{2t+1} - e^{-3}] u(t+2)}$$