EEE203 Assignment 1

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Deadline: 23:59 2018/10/30

1 Signal 20 mark

For $x(t)$ indicated in Figure 1, sketch the following:

(a) $x(1-t)[u(t+1)-u(t-2)]$

(b) $x(1-t)[u(t+1)-u(2-3t)]$

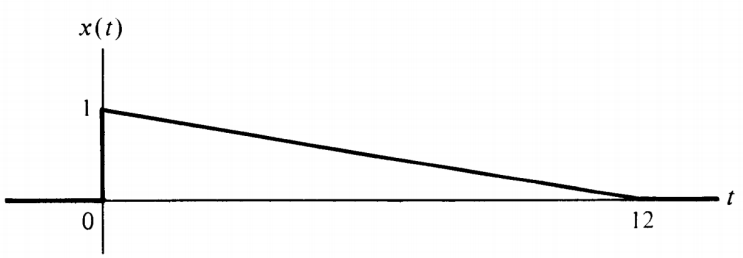


Figure 1: Waveform of x(t)

2 System 20 mark

Determine the following system is Linear? Time-invariant? Causal?

Clearly state your reasoning.

(a) $y(t) = x(t)u(t)$

(b) $y(t) = x(1-t)$

(c) $y(t) = x(2t)$

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

3 Convolution 20 mark

Determine the continuous-time convolution of $x(t)$ and $h(t)$ for the following three cases:

(a)

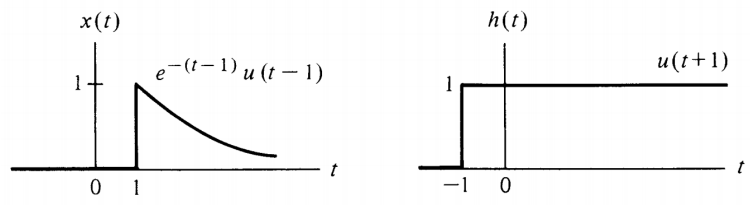


Figure 2: Question 3, (a)

(b)

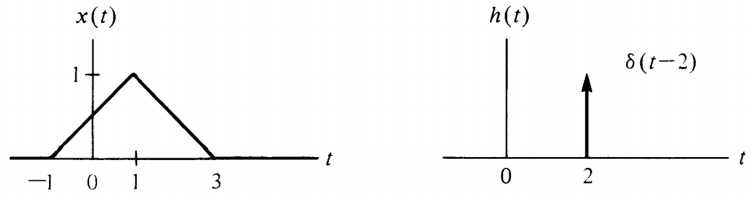


Figure 3: Question 3, (b)

4 Convolution 20 mark

As shown in Figure , the system is formed by some sub-systems, the impulse responses of the sub-systems are:

$$h_1(t) = u(t)$$

$$h_2(t) = \delta(t-1)$$

$$h_3(t) = -\delta(t)$$

Please find the impulse response of the overall system $h(t)$

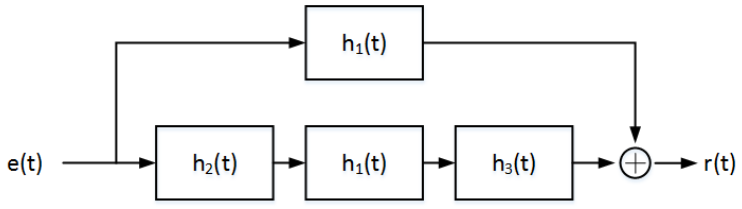
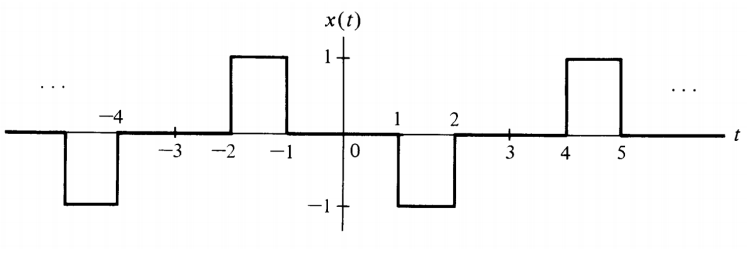


Figure 4: Question 4

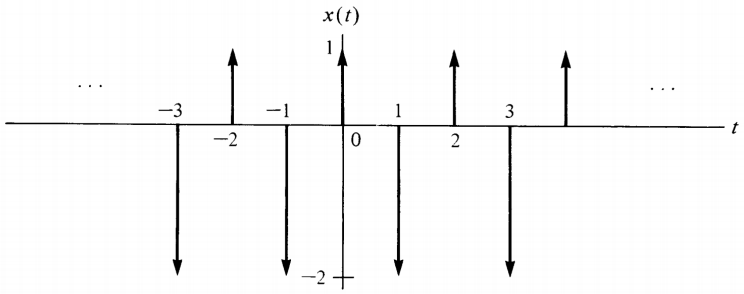
5 Fourier series 20 mark

By evaluating the Fourier series analysis equation, determine the Complex Exponential Fourier series for the following signals.



(a)

Figure 5: Question 5, (a)



(b)

Figure 6: Question 5, (b)