EE 207-Fall 2015(151)
QZ1

Sec	Ser	ID	Name **KEY**

Q1 (Part 1) If δ(t) is the delta function find the followings:

(a) g(4–t)* δ(t–4) ?

g(4–(t–4)) = g(8–t)

(b) $(3t^2+1)\delta(t-1)$

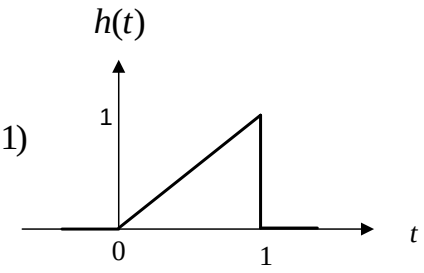
$(3(1)^2+1)\delta(t-1) = 4\delta(t-1)$

(c) $\int_{-\infty}^{\infty}(3t^2+1)\delta(t-1)dt$

4

Q1 (Part 2) If impulse response $h(t)$ of a LTI system is

$h(t) = r(t) - r(t-1) - u(t-1)$

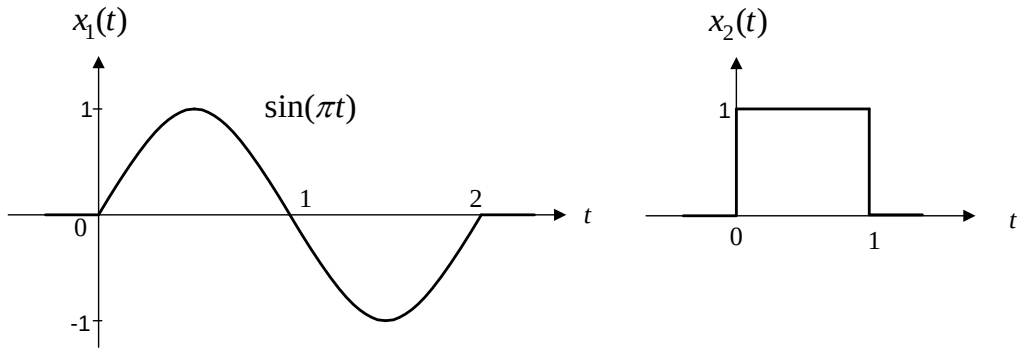


Is the system **memory/momeryless causal/non causal BIBO/ no BIBO**
Justify your answer in the table briefly

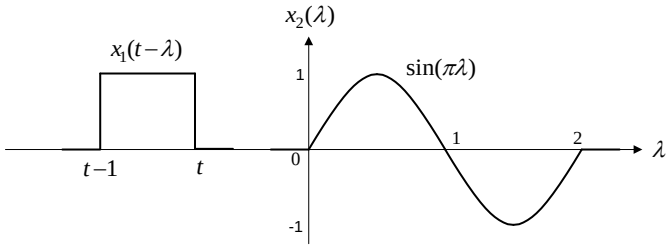
	Answer	Justification
memory/momeryless	Memory	$h(t) \neq \delta(t)$
causal/non causal	Causal	$h(t) = 0 \quad t < 0$
BIBO/ no BIBO	BIBO	$\int_{-\infty}^{\infty} \lvert h(t) \rvert < \infty$

Q2

Let $x_1(t)$ and $x_2(t)$ be two signals as shown below:



Evaluate the convolution integral $x_1(t)*x_2(t)$?



$t < 0$ $\quad x_1(t) * x_2(t) = 0$ No overlapping

$0 < t < 1$ $\quad x_1(t) * x_2(t) = \int_0^t (\sin \pi\lambda)(1) d\lambda = -\frac{\cos \pi\lambda}{\pi}\Big|_0^t = \frac{1}{\pi}[1 - \cos \pi t]$

$1 < t < 2$ $\quad x_1(t) * x_2(t) = \int_{t-1}^t (\sin \pi\lambda)(1) d\lambda = -\frac{\cos \pi\lambda}{\pi}\Big|_{t-1}^t = \frac{1}{\pi}[\cos \pi(t-1) - \cos \pi t]$

$2 < t < 3$ $\quad x_1(t) * x_2(t) = \int_{t-1}^2 (\sin \pi\lambda)(1) d\lambda = -\frac{\cos \pi\lambda}{\pi}\Big|_{t-1}^2 = \frac{1}{\pi}[\cos \pi(t-1) - \cos 2\pi]$

$= \frac{1}{\pi}[\cos \pi(t-1) - 1]$

$t > 3$ $\quad x_1(t) * x_2(t) = 0$ No overlapping