Note Title EE362 Review Session 1 2/19/2019

EXAM 1 2/21/2019 at class

Lectures 1 – 5

HW 1 – 4

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(1) $y(t) = 3\sin(x(t)) + 2$

$x_1(t) \rightarrow y_1(t) = 3\sin(x_1(t)) + 2$

$x_2(t) \rightarrow y_2(t) = 3\sin(x_2(t)) + 2$

$x_1(t) + x_2(t) \rightarrow y_3(t) = 3\sin(x_1(t) + x_2(t)) + 2$

$y_1(t) + y_2(t) \stackrel{?}{=} y_3(t)$ NO

Time-Invariant

non-linear

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(2) $y(t) = 3\sin(t)\, x(t)$

$x_1(t) \rightarrow y_1(t) = 3\sin(t)\, x_1(t)$

$x_2(t) \rightarrow y_2(t) = 3\sin(t)\, x_2(t)$

$x_1(t) + x_2(t) \rightarrow y_3(t) = 3\sin(t)\,[x_1(t) + x_2(t)]$

$y_1(t) + y_2(t) \stackrel{?}{=} y_3(t)$ ✓

Linear

time-varying

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(3) $y(t) = 3\sin(t)\, x(t) + 2$

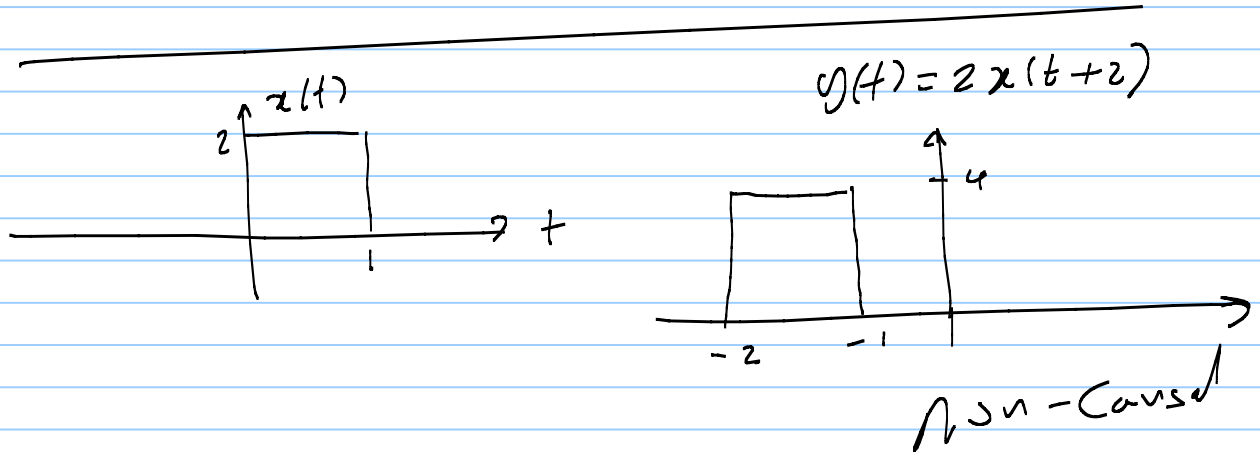
$x_1(t) \rightarrow y_1(t) = 3\sin(t)\, x_1(t) + 2$

$x_2(t) \rightarrow y_2(t) = 3\sin(t)\, x_2(t) + 2$

$x_1(t) + x_2(t) \rightarrow y_2(t) = 3\sin(t)\{x_1(t) + x_2(t)\} + 2$

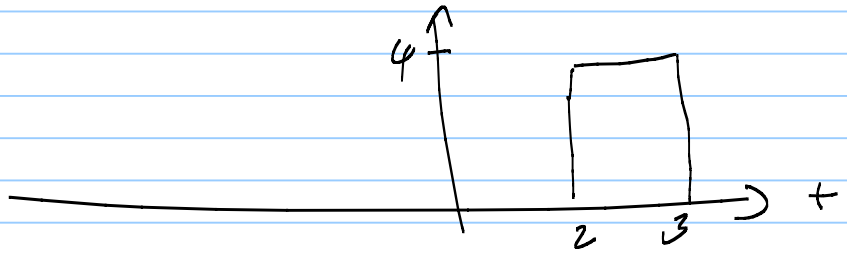
$y_1(t) + y_2(t) \stackrel{?}{=} y_3(t)$ ✗

Time-Varying



Non-Causal

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



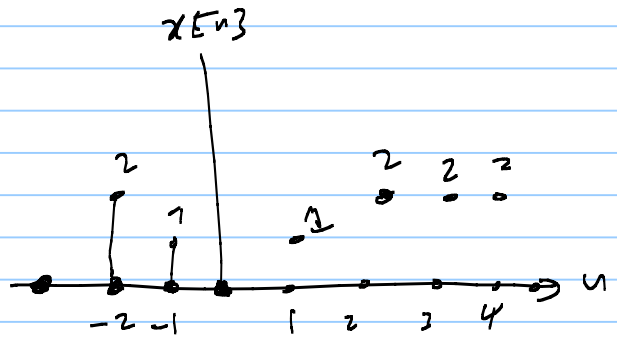
causal

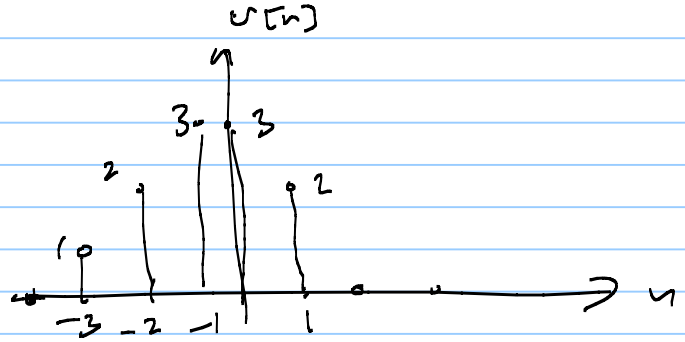
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④ $y(t) = tx(t-2) + 2$

- has memory
- non-linear
- causal system
- Time-Varying

(6)





$x[n] * v[n]$

	1	2	3	3	2
2	2	4	6	6	4
1	1	2	3	3	2
0	0	0	0	0	0
1	1	2	3	3	2
2	2	4	6	6	4
2	2	4	6	6	4
2	2	4	6	6	4

2 ← 5 ← 8 ← 10 ← 11 ← 11 ← 15 ← 18 ← 16 ← 10 ← 4

$y[-5] = 2$

$y[-4] = 5$

$y[-3] = 8$

$y[-2] = 10$

$y[-1] = 11$

$y[0] = 11$

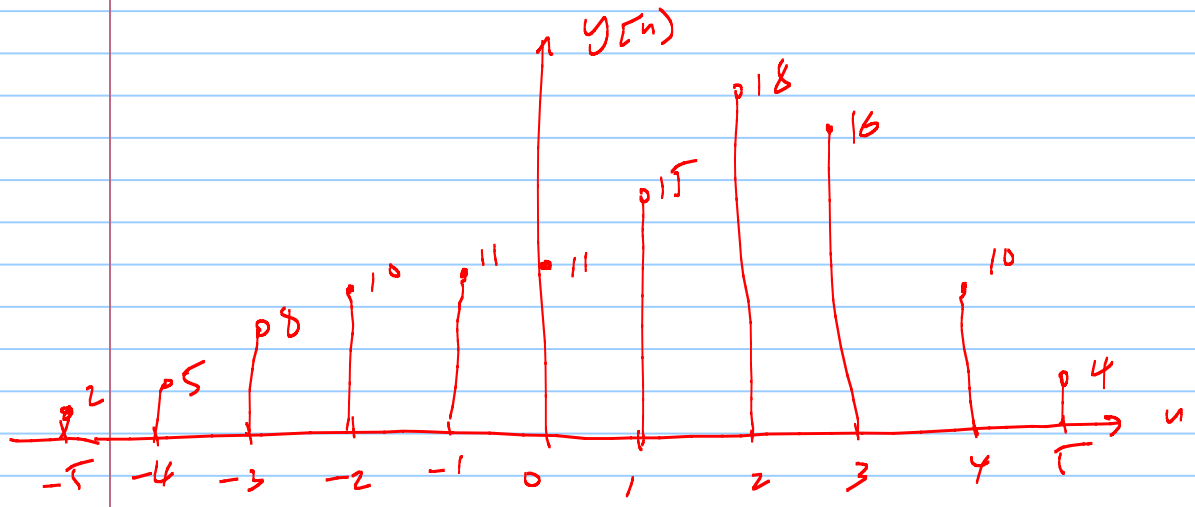
$y[1] = 15$

$y[2] = 18$

$y[3] = 16$

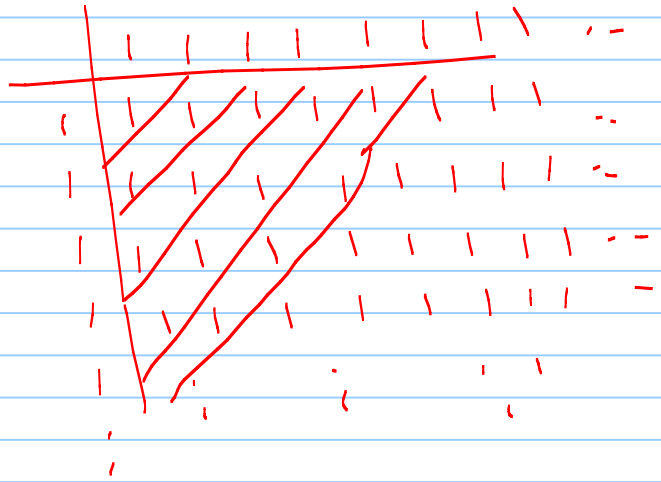
$y[4] = 10$

$y[5] = 4$



(7) $x[n] = u[n]$; $v[n] = u[n]$

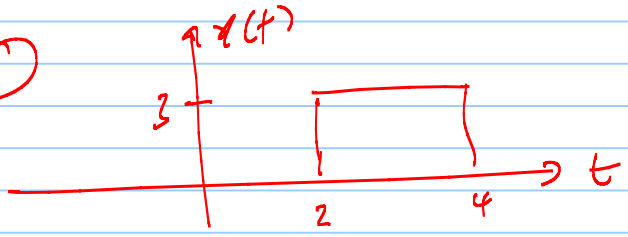
$x[n] * v[n] = r[n+1]$

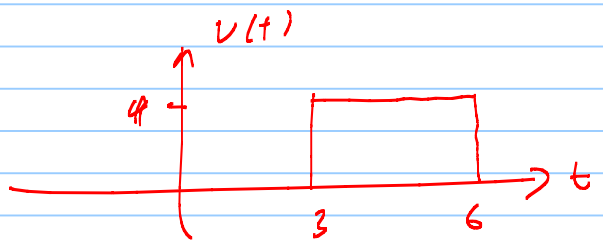


(8) $x(t) = u(t)$; $v(t) = u(t)$

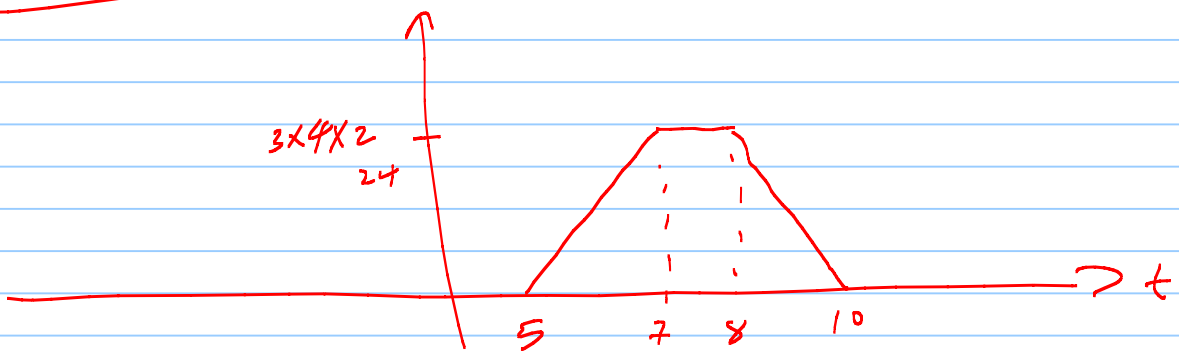
$x(t) * v(t) = r(t)$

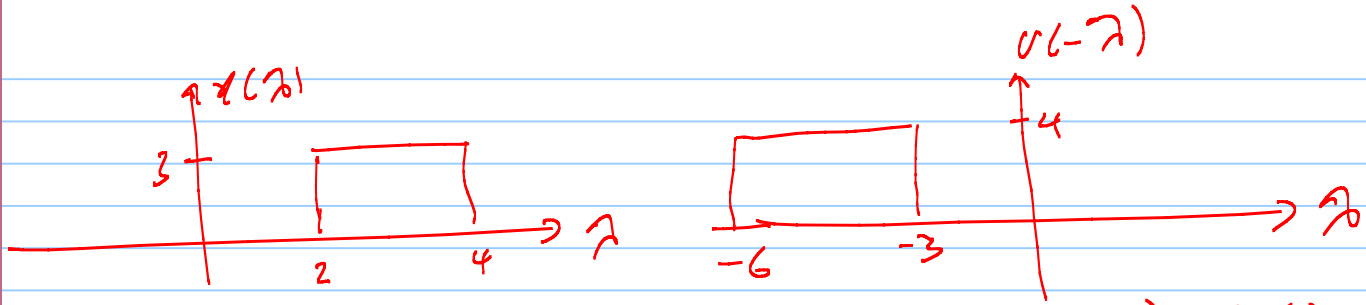
(9)

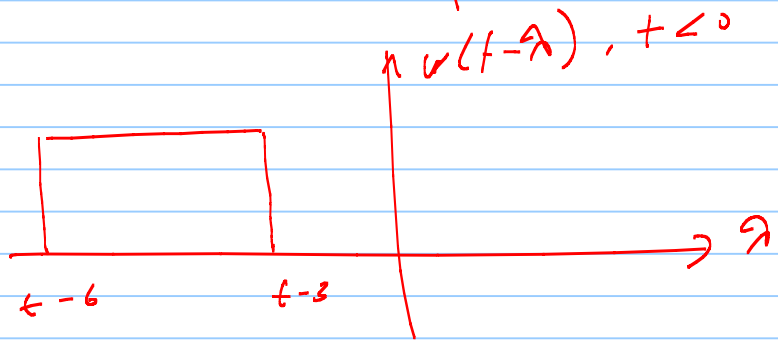


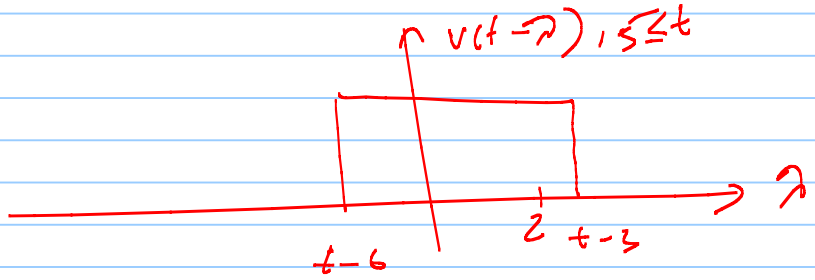


$x(t) * v(t) = ?$

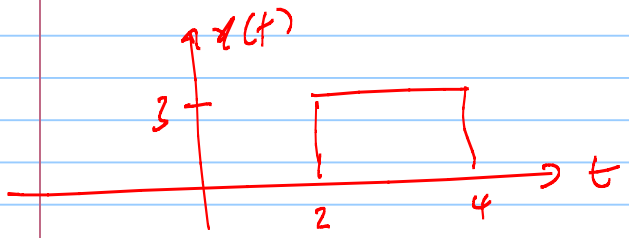


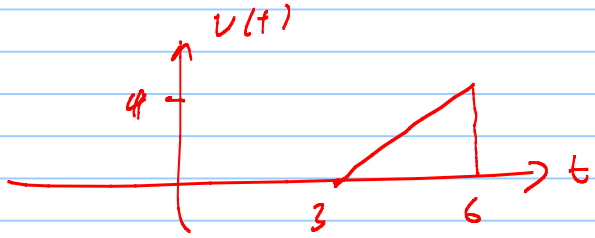

x(λ)
3
2
4
λ
v(-λ)
4
-6
-3
λ

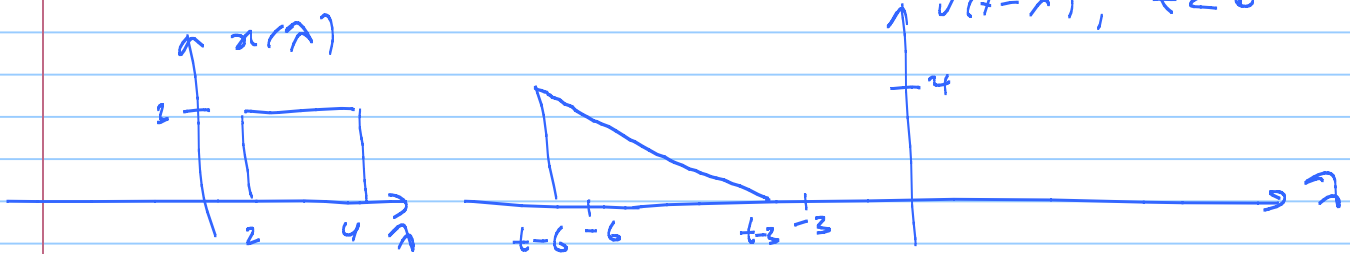

v(t-λ), t<0
t-6
t-3
λ


v(t-λ), 5≤t
t-6
2
t-3
λ

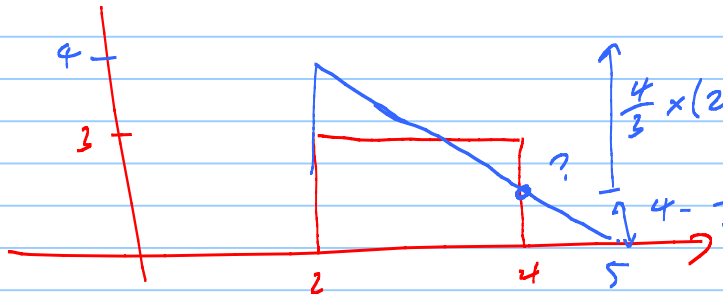
(10)


x(t)
3
2
4
t


v(t)
4
3
6
t

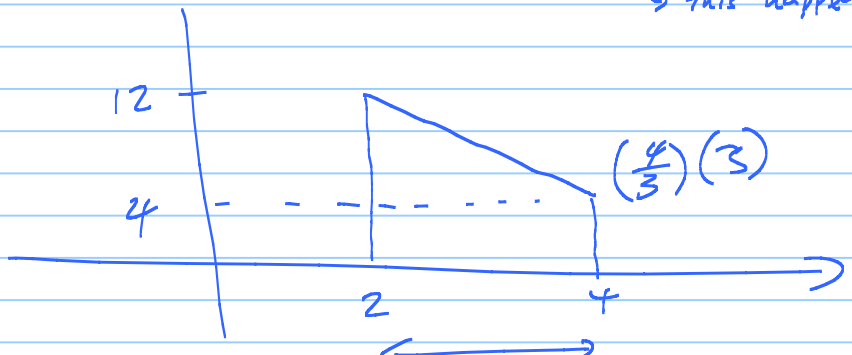

x(λ)
1
2
4
λ
t-6
-6
t-3
-3
v(t-λ), t<0
4
λ





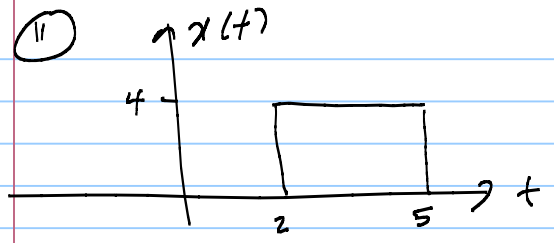
↳ this happens when $t = 8$

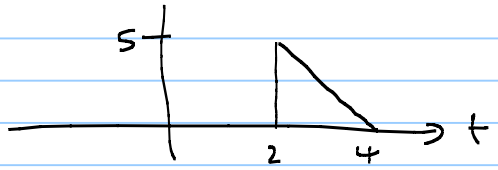
$t - 3 = 5 \Rightarrow t = 8$

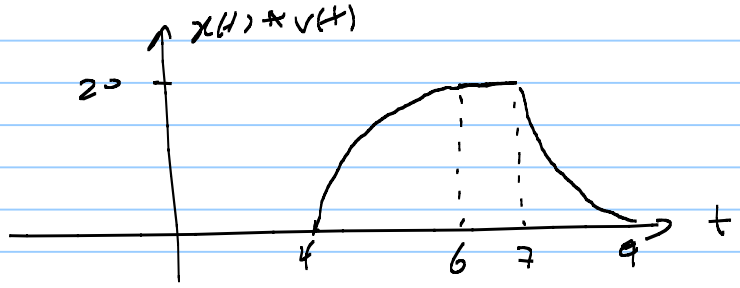


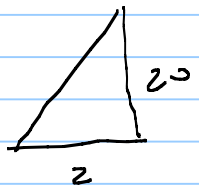
The area $= (4)(2) + \frac{1}{2}(2)(8) = 16$

(11)









area = 20

This happens when $t = 6$

OR $t - 2 = 4$