

SS Lab Assignment - V

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Q Compute the linear convolution of the following

a) $x(n) = [1 \ 3 \ 2 \ 1]$ $h(n) = [1 \ 1]$

$h(n) \backslash x(n)$	1	3	2	1
1	①	3	2	1
1	1	3	2	1

$y(n) = [1 \ 4 \ 5 \ 3 \ 1]$

b) $x(n) = [1 \ 2 \ 3 \ 4 \ 5]$ $h(n) = [1 \ -1]$

$h(n) \backslash x(n)$	1	2	3	4	5
1	①	2	3	4	5
-1	-1	-2	-3	-4	-5

$y(n) = [1 \ 1 \ 1 \ 1 \ -5]$

c) $x(n) = [2 \ 1 \ 3 \ 2 \ 1]$ $h(n) = [4 \ 3 \ 2 \ 1]$

$h(n) \backslash x(n)$	2	1	3	2	1
4	8	4	12	8	4
3	6	3	9	6	3
2	4	2	6	4	2
1	2	1	3	2	1

$y(n) = [8 \ 10 \ 19 \ 21 \ 17 \ 10 \ 4 \ 1]$

$$d) x(n) = [1 \quad 1 \quad 1]$$

↑

$$h(n) = [1 \quad 0.5 \quad 0.25]$$

↑

$h(n) \backslash x(n)$	1	1	1
1	1	1	1
0.5	0.5	0.5	0.5
0.25	0.25	0.25	0.25

$$y(n) = [1 \quad 1.5 \quad 1.75 \quad 0.75 \quad 0.25]$$

↑

$$e) x(n) = [1 \quad 0 \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1] \quad h(n) = [1 \quad 1 \quad 1]$$

↑

$h(n) \backslash x(n)$	1	0	1	0	1	1	1	1
1	1	0	1	0	1	1	1	1
1	1	0	1	0	1	1	1	1
1	1	0	1	0	1	1	1	1

$$y(n) = [1 \quad 1 \quad 2 \quad 1 \quad 2 \quad 2 \quad 3 \quad 3 \quad 2 \quad 1]$$

↑

$$f) x(n) = [3 \quad 2 \quad 1 \quad 0] \quad h(n) = [1 \quad 1 \quad 1]$$

↑

$h(n) \backslash x(n)$	3	2	1	0
1	3	2	1	0
1	3	2	1	0
1	3	2	1	0

$$y(n) = [3 \quad 5 \quad 6 \quad 3 \quad 1 \quad 0]$$

↑

g) $x(n) = [3 \ 2 \ 1 \ 0 \ 0 \ 0]$ $h(n) = [1 \ 1 \ 1]$

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$h(n) \backslash x(n)$	3	2	1	0	0	0
1	3	2	1	0	0	0
1	3	2	1	0	0	0
1	3	2	1	0	0	0

$y(n) = [3 \ 5 \ 6 \ 3 \ 1 \ 0 \ 0 \ 0]$

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Q Find the output of the system if input $x(n]$ and impulse response $h(n)$ are given by

$$x(n) = \begin{cases} 1 & n = -2, 0, 1 \\ 2 & n = -1 \\ 0 & \text{otherwise} \end{cases}$$

$$h(n) = \delta(n) - \delta(n-1) + \delta(n-2) - \delta(n-3)$$

A) $x(n) = [1 \ 2 \ 1 \ 1]$ $h(n) = [1 \ -1 \ 1 \ -1]$

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$h(n) \backslash x(n)$	1	2	1	1
1	1	2	1	1
-1	-1	-2	-1	-1
1	1	2	1	1
-1	-1	-2	-1	-1

$y(n) = [1 \ 1 \ 0 \ 1 \ -2 \ 0 \ -1]$

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