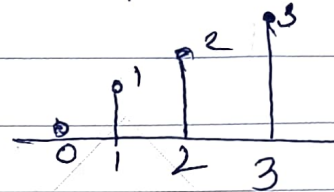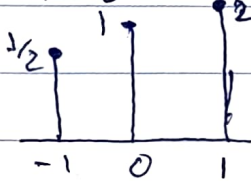Name :- Putval Madhukar Bhude
Roll no. :- S20230010193
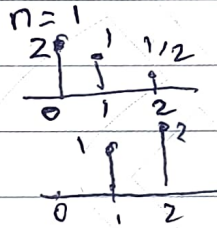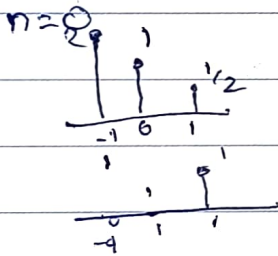
Q1

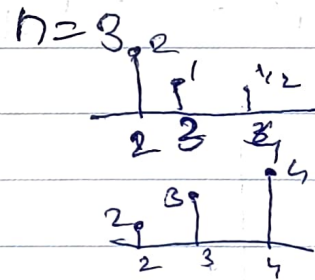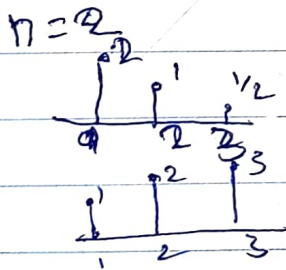$x_1[n] = \left(\frac{1}{2}\right)^{-n} [u[n+1] - u[n-2]]$, $x_2[n] = r[n]$

$y[n] = x_1[n] * x_2[n]$

$y[n] = \sum_{k=-\infty}^{0} x_2[k] \cdot x_1[n-k]$

n=0

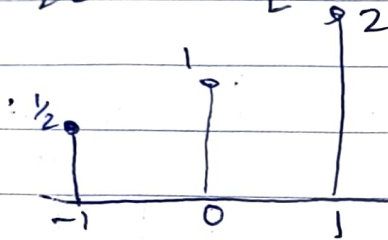$y[0] = \frac{1}{2}$

n=1

$y[1] = 1 + \frac{1}{2}(2) = 2$

n=2

$y[2] = 2 + 2 + \frac{1}{2}(3)$
$= 4 + 3/2$
$= 18/2$

n=3

$y[3] = 4 + 3 + 2$
$= 9$

Q2

$$x_1[n] = \left(\tfrac{1}{2}\right)^{-n} [u[n+J] - u[n-2)]$$

$$x_2[n] = 2[u[n+2] - u[n-J])$$

$$x_1[n] = \{\tfrac{1}{2}, \underset{\uparrow}{1}, 2\}$$

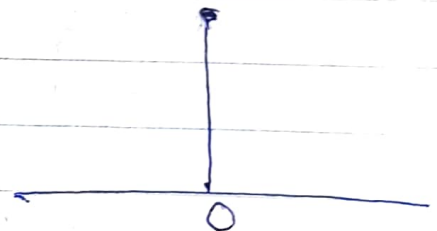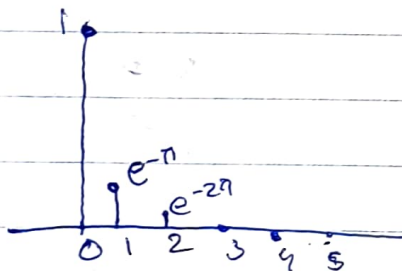$$x_2[n] = \{1, 1, \underset{\uparrow}{1}\}$$
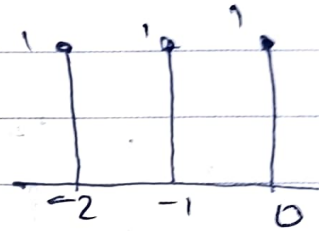
$$y[n] = x_1 * x_2$$

	1	1	1
1/2	1/2	1/2	1/2
1	1	1	1
2	2	2	2

$$-1 \longrightarrow 1$$
$$-2 \longrightarrow 0$$
$$\overline{}$$
$$-3 \longrightarrow 1$$

$$y[n] = \{\tfrac{1}{2}, \tfrac{3}{2}, \tfrac{7}{2}, \underset{\uparrow}{3}, 2\}$$

Q3

$$x[n] = e^{-\pi n} u[n], \quad h[n] = \delta[n]$$

$$x[n] = \{\underset{\uparrow}{1}, e^{-\pi}\}$$

$$h[n] = \{\underset{\uparrow}{1}\}$$

* Property → if we do $x[n] * \delta[n]$ we
get same $x[n]$.
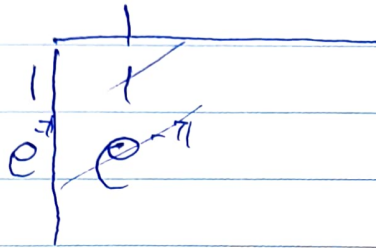
$$y[n] = x[n] * h[n]$$
$$= [\underset{\uparrow}{1}, e^{-a}]$$

Q) $x[n] = \{1, -2, 6, \underset{\uparrow}{3}, -3, -1, 2\}$

$h[n] = \{1, \underset{\uparrow}{-1}, 1\}$

$y[n] = x[2n] * h[n-1]$

$x[2n] = \{\underset{-3/2}{1}, \underset{-2/2}{-2}, \underset{-1/2}{6}, \underset{0/2}{3}, \underset{1/2}{-3}, \underset{2/2}{-1}, \underset{3/2}{2}\}$

$= \{-2, \underset{\uparrow}{3}, -1\}$

$h[n-1] = \{\underset{\uparrow}{1}, -1, 1\}$

$x[2n]$

$h[n-1]$
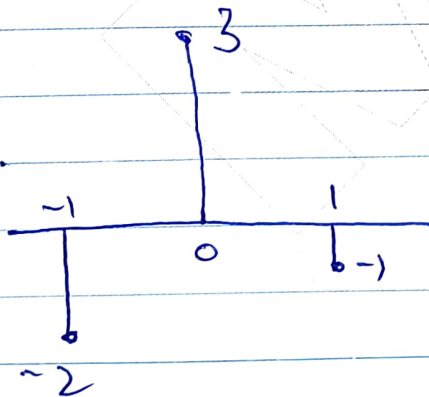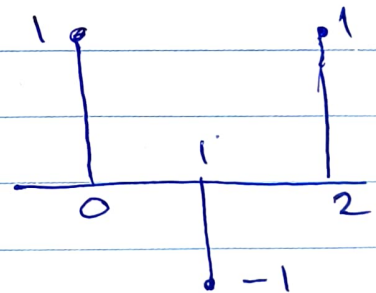
$$\begin{array}{c|ccc} & -2 & 3 & -1 \\ \hline 1 & -2 & 3 & -1 \\ -1 & 2 & -3 & 1 \\ 1 & -2 & 3 & -1 \end{array}$$

$$\begin{array}{ccc} -1 & \longrightarrow & 1 \\ 0 & \longrightarrow & 2 \\ \hline 1 & \longrightarrow & 3 \end{array}$$

$$y[n] = x[2n] * h[n-1]$$

$$= \left[-2, \underset{\uparrow}{5}, -6, 4, -1 \right]$$