Name = Uzair Khan Page (1)

ID: 13909

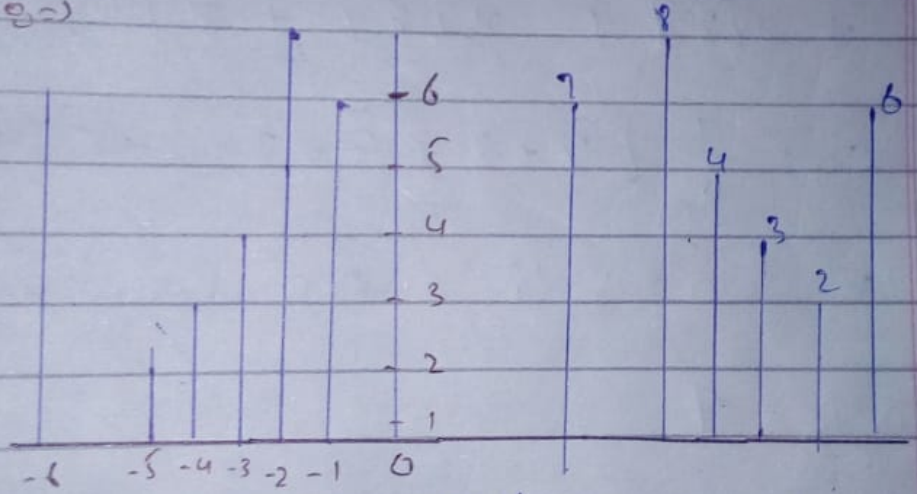
Q(1)

(a) $C_K + N_0 = C_K$

(b) $C_K = C_{N_0 - K} = C_K^*$

$$x[n] = \{7, 8, 4, 3, 2, 6\}$$

Solution:-



$$\Rightarrow C_K = \frac{1}{N_0} \sum_{n=0}^{N_0-1} x[n]\, e^{-j\left(\frac{2\pi}{N_0}\right)Kn}$$

$\because e^{j\phi} = \cos\phi + j\sin\phi$

$$\text{So } e^{-j\left(\frac{2\pi}{2\pi}\right)} = \cos(\pi/2) - j\sin(\pi/2)$$

$$e^{-j(\pi/2)} = \cos \pi/2 \quad j \sin \pi/2$$

$$= \boxed{-j}$$

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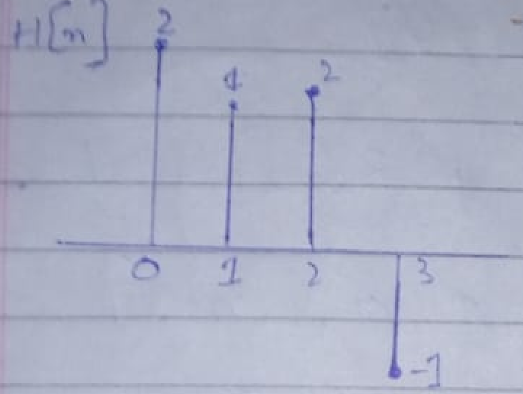
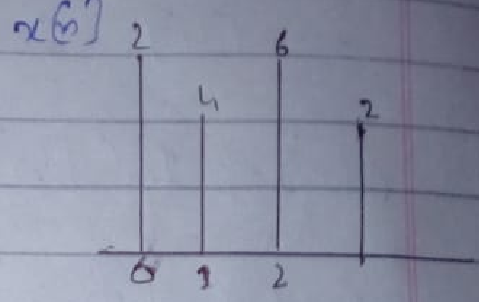
Q(3)

Solution $H[n] = \{2, 1, 2, -1\}$

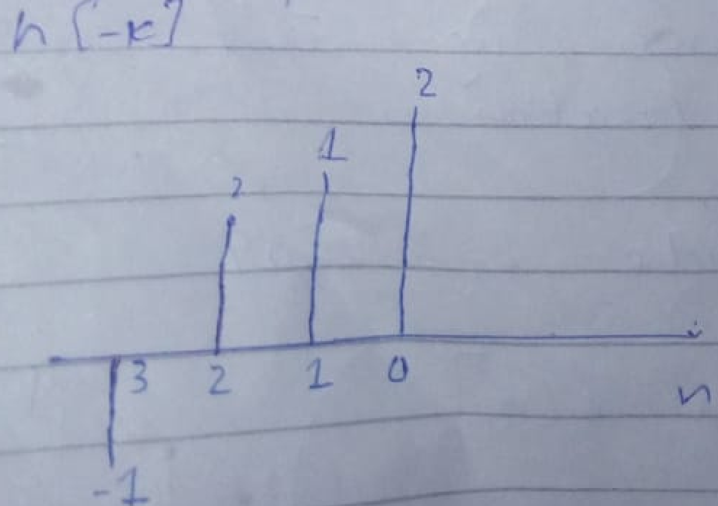
$x[n] = \{2, 4, 6, 2\}$





Length of output = $4 + 4 - 1 = \boxed{7}$

Folding any one but we fold impulse response



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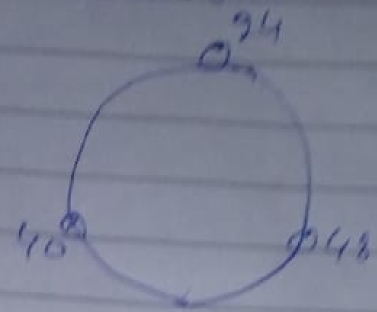
multiplication =>

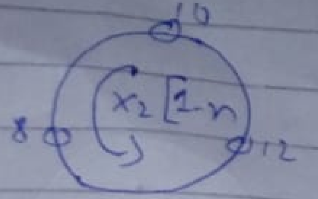


Sum = $y[2] = 112$

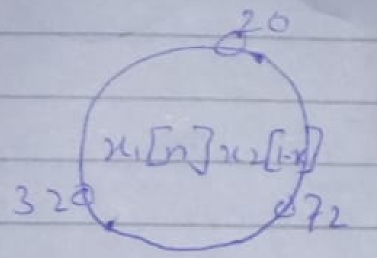
So $y[n] = [124, 124, 112]$

(3) Sum $y = 124$

Now we shift the Folded Sequences Anti clockwise

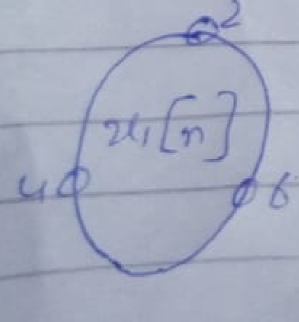


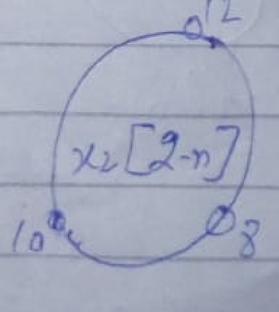
(4) multiplication =>



Sum $y[1] = 124$

Second Shift





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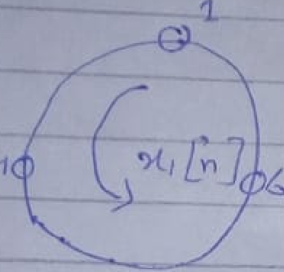
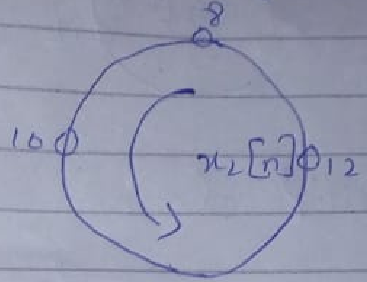
Q.5)

Solve:-> $x_1[n] = \{2, 4, 6\}$

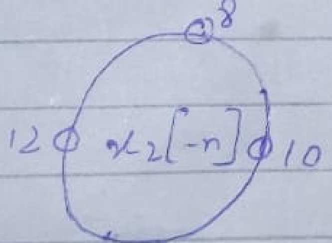
$x_2[n] = \{8, 10, 12\}$

Now we make an cycle

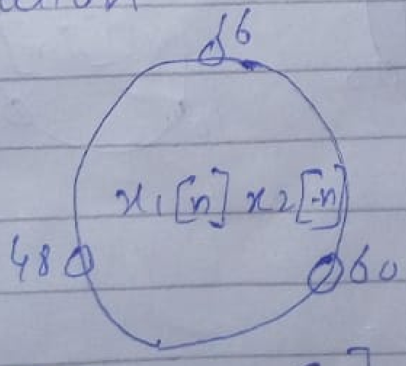




(i) Folding = in this ~~sequence~~ method we make clockwise image of one sequence



(2) multiplication



$x_1[n] * x_2[-n]$

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Q(4) 1D - 13909

Solution => (a) $x[n] = (1/2)^{n-1} u[n-2]$

(b) $x[n] = \delta[n] + \delta[n-1] + \delta[n-2]$

$\Rightarrow X(e^{j\omega}) = \sum_{n=-\infty}^{\infty} x[n] e^{-j\omega n}$

$\sum_{n=0}^{\infty} (\alpha^{n}) (e^{-j\omega})^{n}$

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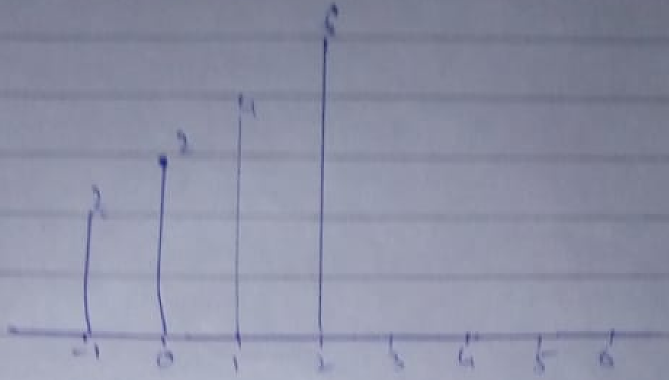
Now for product sequence

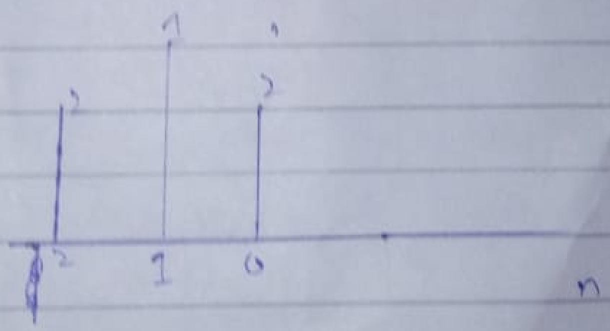
x[n] h[-k]



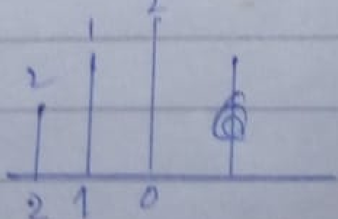
Sum $y(0) = 4 + 2 + 6 - 2 = 10$

* Shidtling

$n - 1 = 0$



x[n] h[1-k]



$y(1) = 2 + 1 + 2 = 5$

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Q(2)

Sol- $x[n] = [1, 3, 9, 0, 9]$

$K = 0$ To 4

$\Rightarrow x[0]\,\delta[n-0] + x[1]\,\delta[n-1]$
$+ x[2]\,\delta[n-2] + x[3]\,\delta[n-3]$
$+ x[4]\,\delta[n-4]$

$\delta[n] \Rightarrow 1\,\delta[n] + 3\,\delta[n-1]$

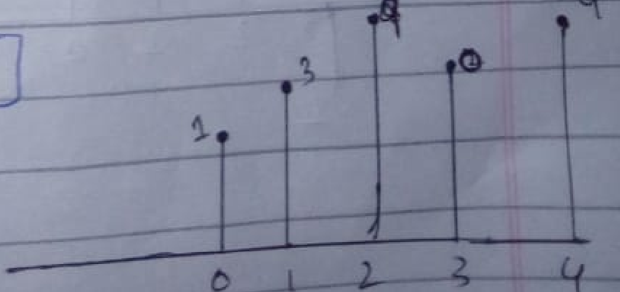
$+ 9\,\delta[n-2] + 0\,\delta[n-3]$
$+ 9\,\delta[n-4]$

magnitude = 1
Location = $\delta[n]$

Now the Sequence decomposed Sequence using their magnitude and location

magnitude = 1, 3, 9, 0, 9

Location = $\delta[n]$



Name: uzair khan Page = 3 ID = 13909

$c_2 = \frac{-1}{7} \mp \frac{j}{23}$

1st Property

$C_K + N_U = C_K$

$C_1 + 4 = C_1$

2nd property

$C - K = C_{NU} - K = C_K^*$

$= C_4 - 1 = C_1^*$

$C_3 = C_1^*$

$\frac{-1}{7} - \frac{1}{23} j = \frac{-1}{7} + \frac{1}{23} \pm j$

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$$C_k = \frac{1}{6} \sum_{n=0}^{6-1} x[n] \, (-j)^{kn}$$

$$C_k = \frac{1}{6} \sum_{n=0}^{5} x[n] \, (-j)^{kn}$$

$k=0$ $\quad C_0 = \frac{1}{6} \sum_{n=0}^{5} x[n] (1)$

$$C_0 = \frac{1}{6} [x[7] + x[8] + x[4] + x[3] + x[2] + x[6]]$$

$$C_0 = \frac{1}{6} [7 + 8 + 4 + 3 + 2 + 6] = \frac{5}{6}$$

$\Rightarrow C_0 = 5.16$ DC componente

$\Rightarrow k = 1$

$$C_1 = \frac{1}{6} \sum_{n=0}^{5} x[n] \, (-j)^{n}$$

$$C_1 = \frac{1}{4} (-j)^0 x[7] + (-j)^1 x(8) + -j^2 x[4] + (-j)^3 x[3] + -j^4 x[2] + -j^3 x[6]]$$

$$\Rightarrow C = \frac{1}{6} [-j - 7 + 23j]$$

$$C_1 = -\frac{1}{7} + \frac{j}{23}$$