Name = Uzair Khan Page (1)

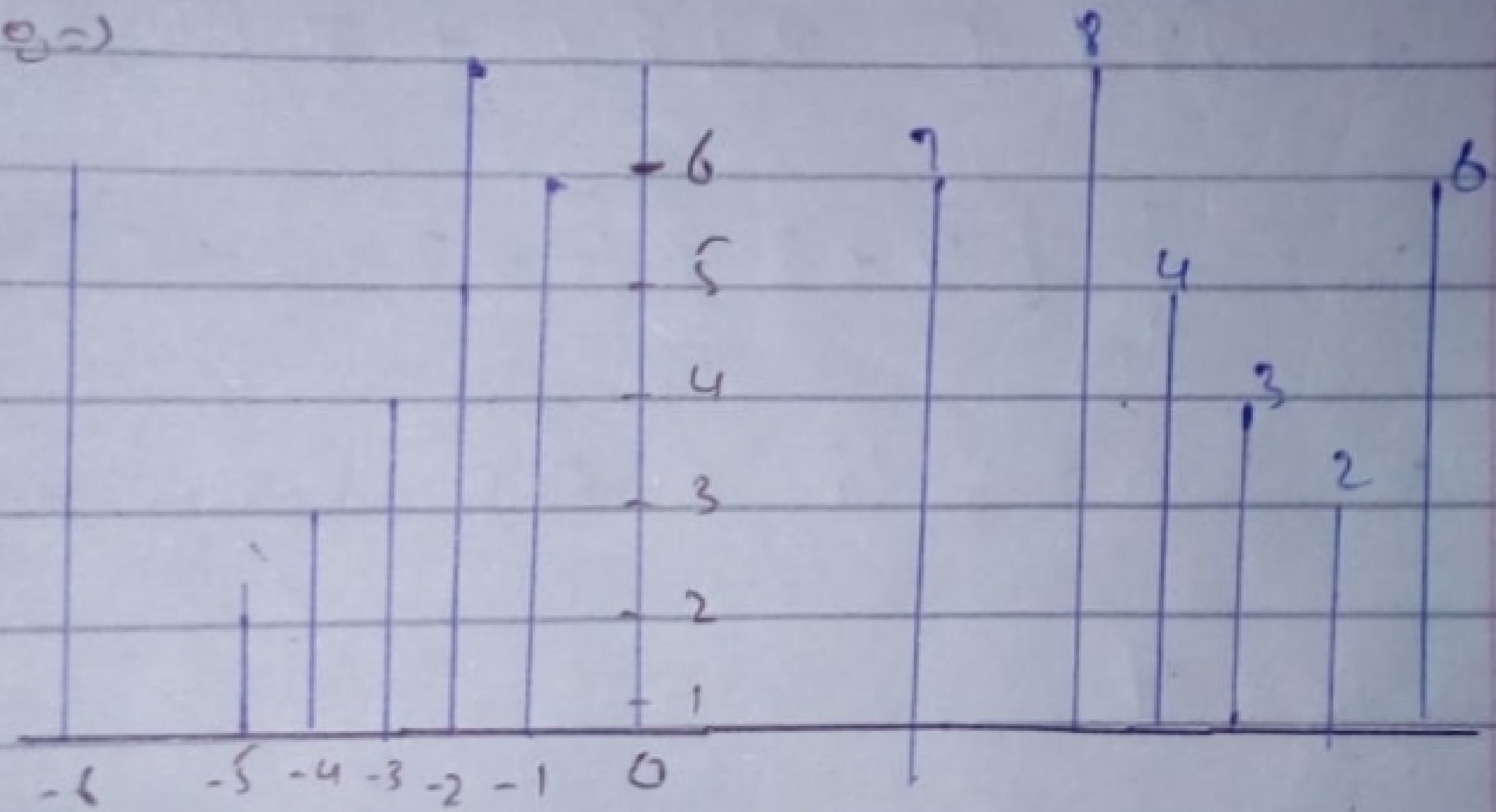
Q(1) ID: 13909

(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:



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

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

So $e^{-j\left(\frac{2\pi}{2\cancel{4}}\right)} = \cos(\pi/2) - j\sin(\pi/2)$

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

$= \boxed{-j}$

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

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

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

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

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

$\Rightarrow \quad C_0 = 5.16 \quad$ DC components

$\Rightarrow K = 1$

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

$$C_1 = \frac{1}{6} (-j)^0 x[7] + (-j)^1 x[8] + -j^2 x[4] + (-j)^3 x[3] + -j^4 x[2] + -j^5 x[6])$$

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

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

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$$C_2 = \frac{-1}{7} + \frac{j}{23}$$

1st Property

$$C_K + N_U = C_K$$

$$C_1 + 4 = C_1$$

2nd Property

$$C_{-K} = C_{N_U - K} = C_K^*$$

$$= C_{4-1} = C_1^*$$

$$C_3 = C_1^*$$

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

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Q(a)

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

$K = 0$ To 4

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

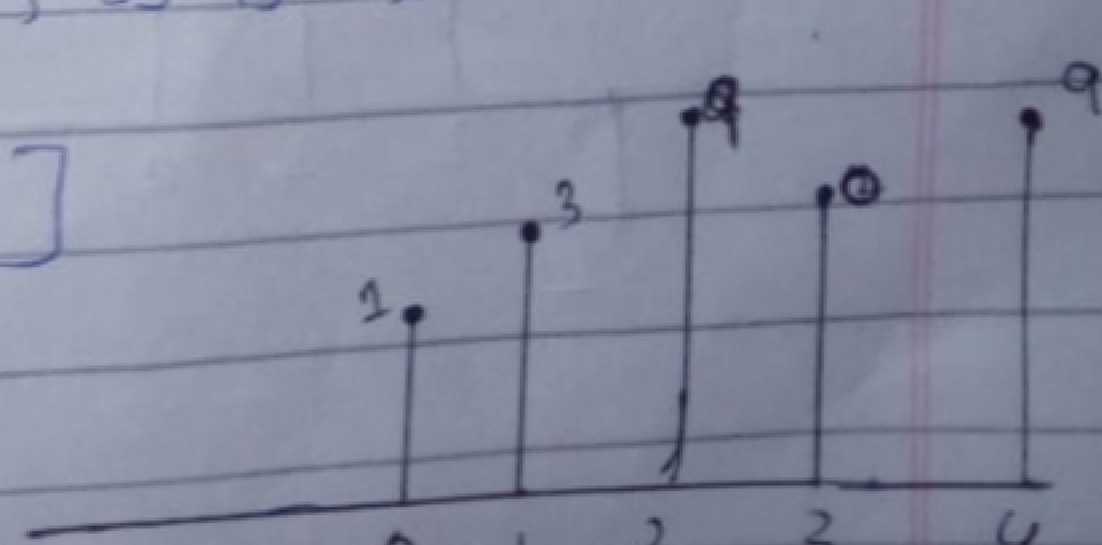
$\delta[n] \Rightarrow 1\,\delta[n] + 3\,\delta[n-1] + 9\,\delta[n-2] + 0\,\delta[n-3] + 9\,\delta[n-4]$

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

Now the ~~sequence~~ decomposed sequence using their magnitude and location

magnitude = 1, 3, 9, 0, 9

Location = $\delta[n]$

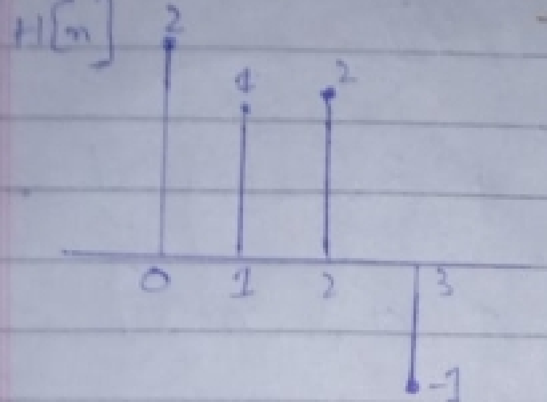


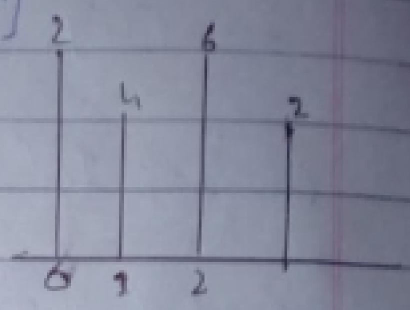
Name= Waqar khan Page = 5 ID = 13909

Q(3)

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

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

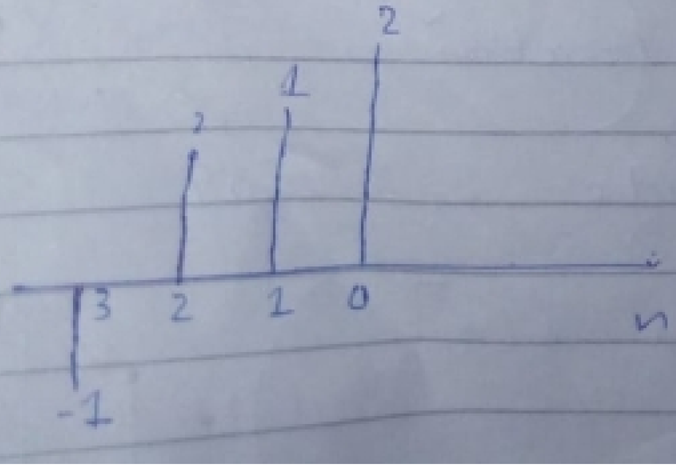




Length of output = $4 + 4 - 1 = \boxed{7}$

Folding any one but we fold impulse response

$h[-k]$



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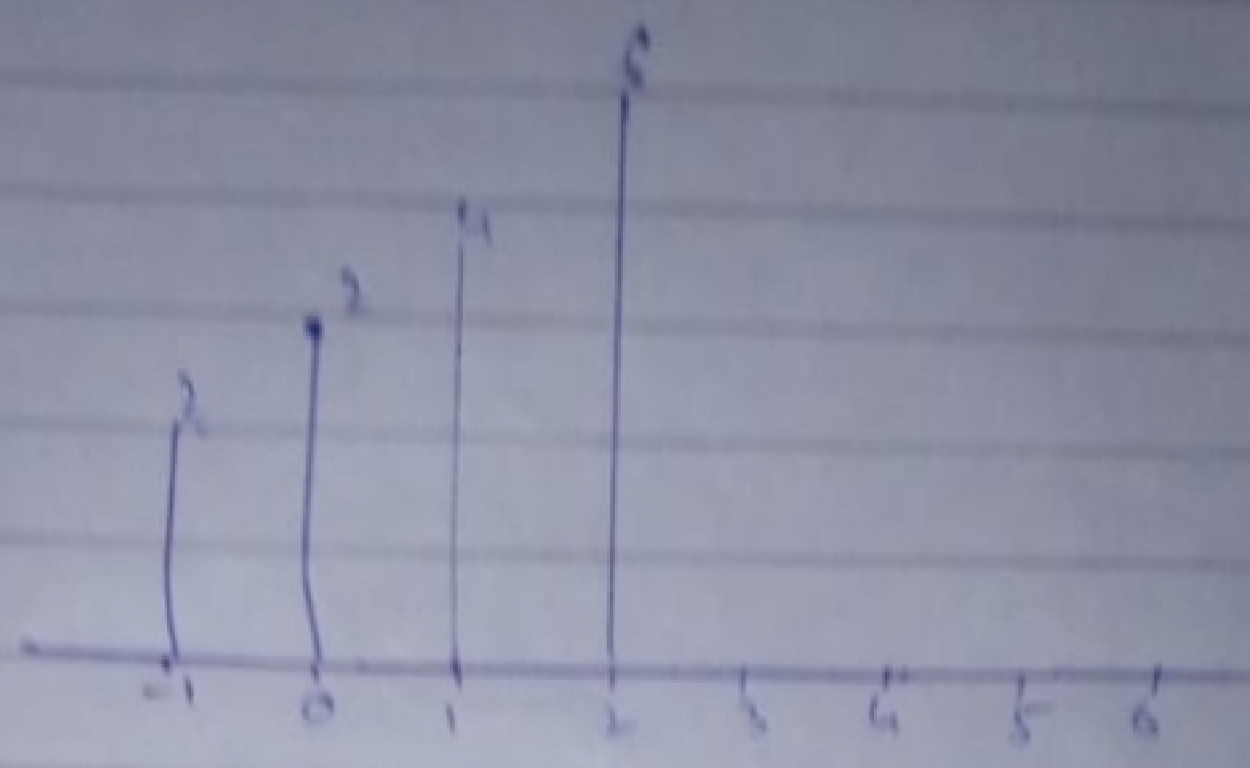
Now for product sequence

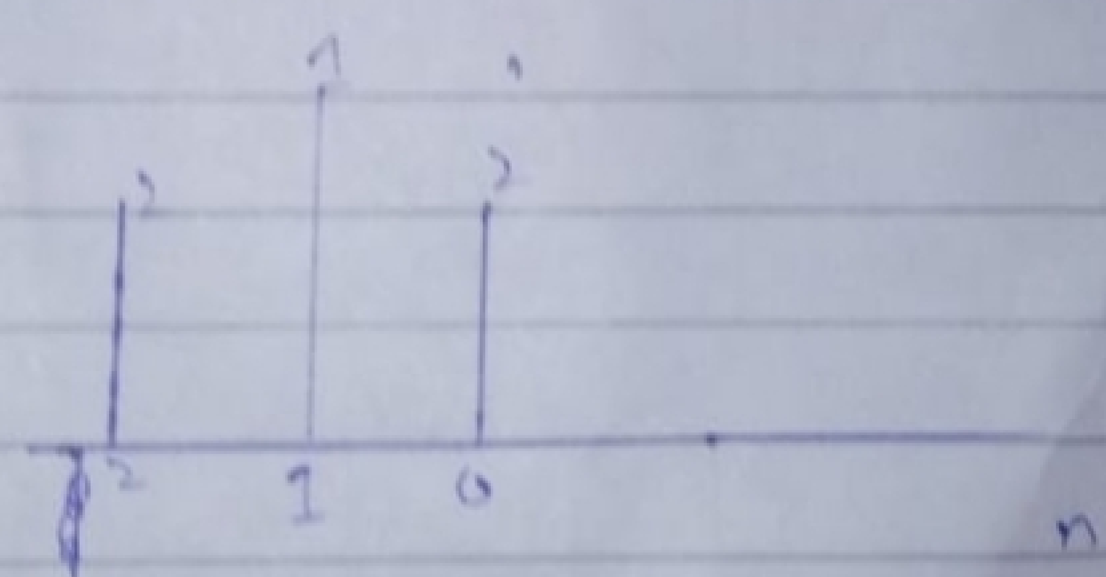
x[n] h [-k]



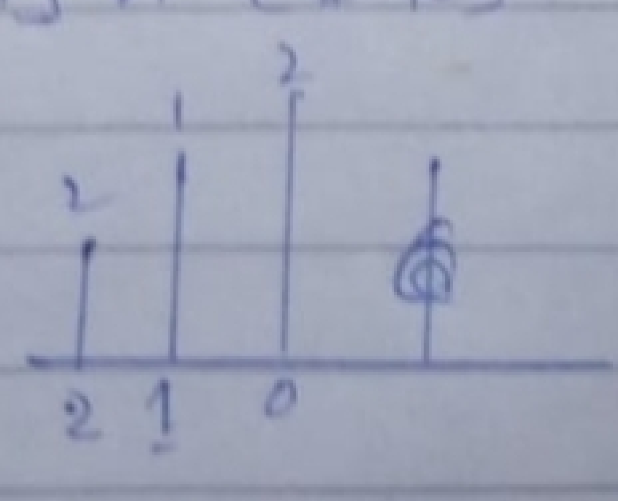
Sum y(1) = 4 + 2 + 6 - 2 = 10

* Shifting

n-1=0



x[n] h [1-k]



y(1 = 2 + 1 + 2 = 5

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Q(4)

Solutions:- (a) $x[n] = \left(\frac{1}{2}\right)^{n-1} u(n-1)$

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

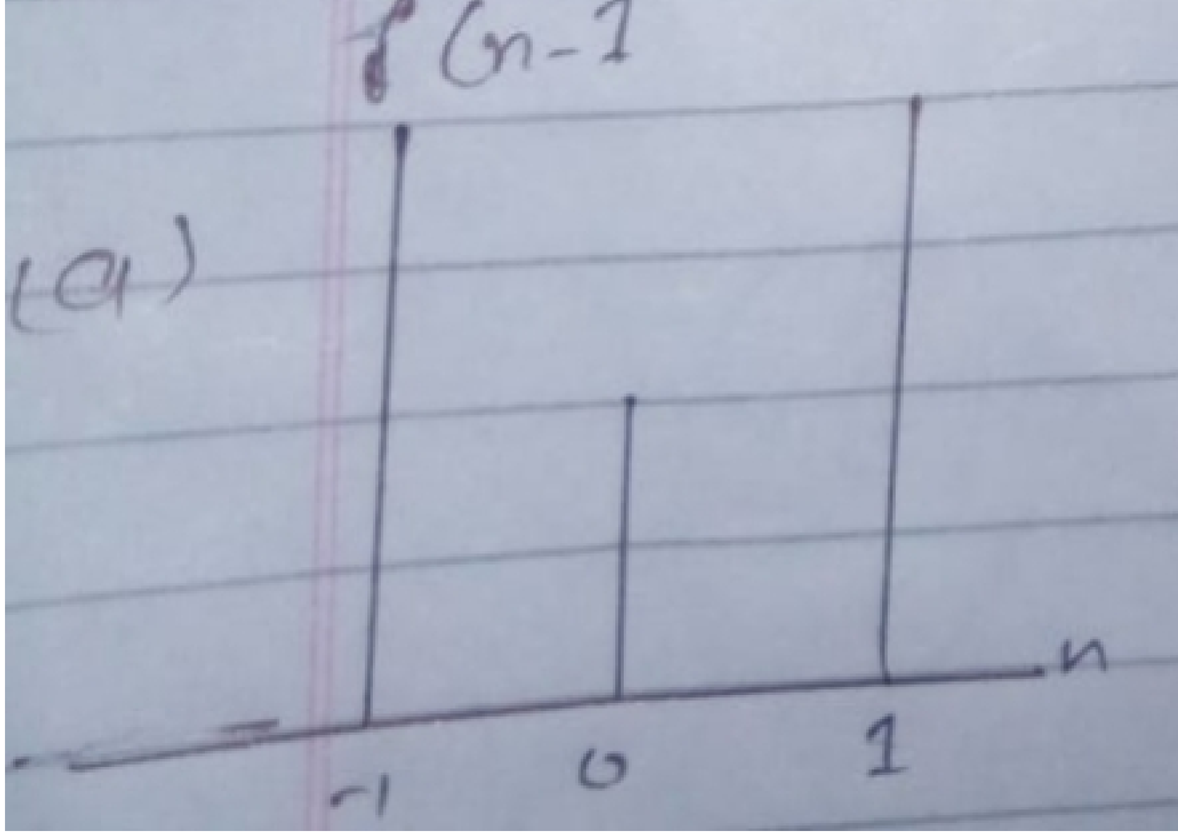
$$x\{e^{j\omega}\} = \sum_{n=-\infty}^{n-1=\infty} \left(\frac{1}{2}\right)^{n-1} u \left(e^{-j\omega n}\right.$$

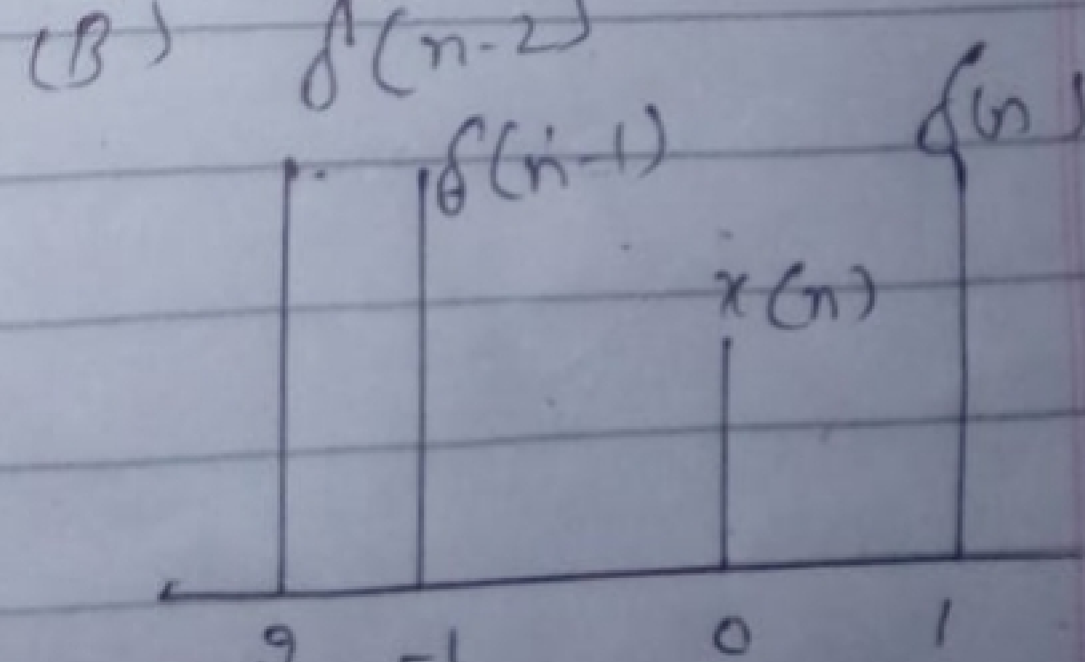
$$\sum_{n=8}^{n-1=8} \left(\frac{1}{2}\right)^{n-1} u \left(e^{-j\omega}\right)$$

$$\sum_{n=-\infty}^{n-1=\infty} n\left(\frac{1}{2} e^{j\omega}\right)^{n-1} u(n-1)$$

$$x(e^{j\omega}) = \frac{1}{1-(\frac{1}{2} n-1\ j\omega)}$$

Now we Draw with spectrum





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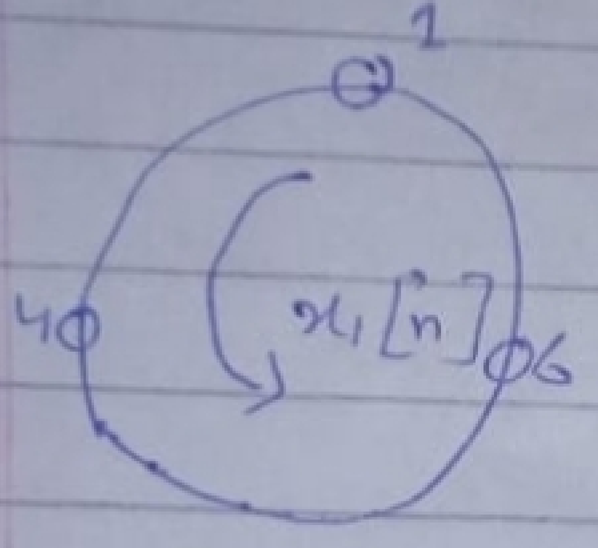
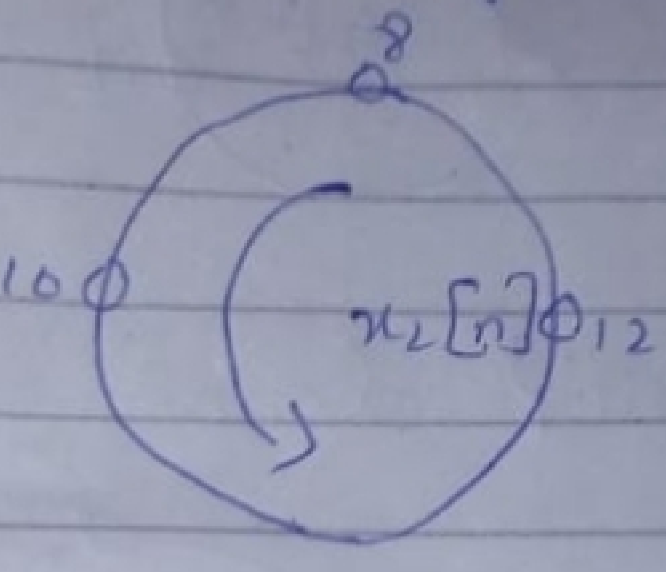
(Q5)

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

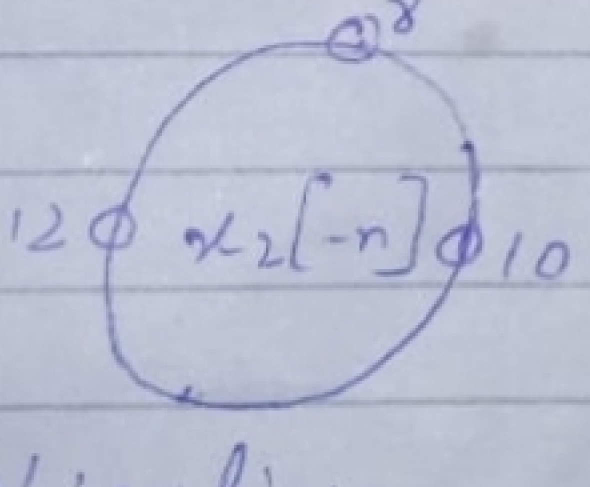
$x_2[n] = \{8, 10, 12\}$

Now we make an cycle

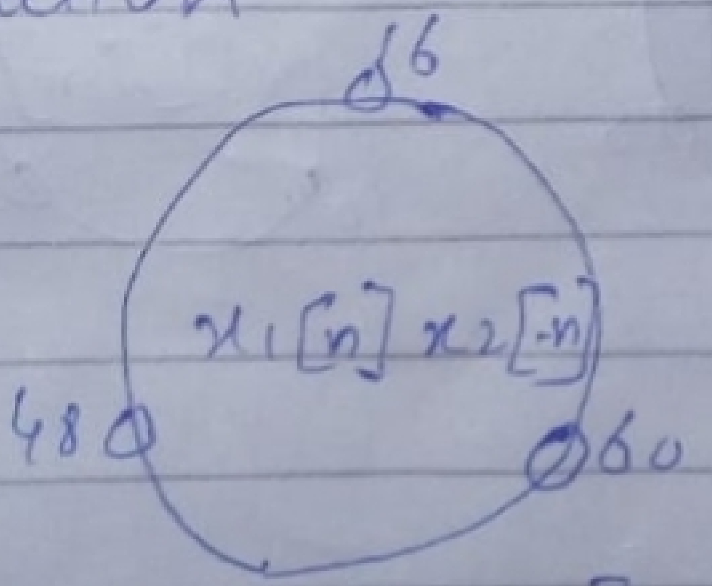




(1) Folding = in this ~~sequence~~ method we make clockwise image of one Sequence



(2) multiplication



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

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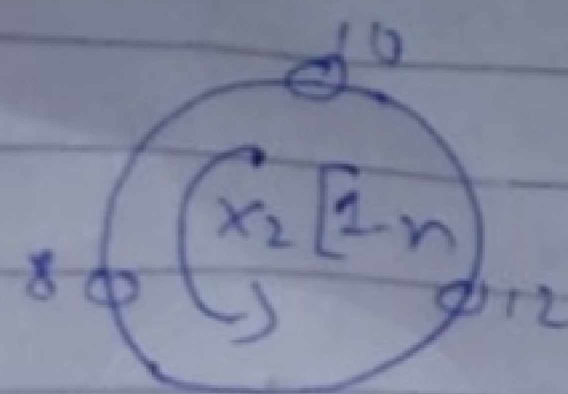
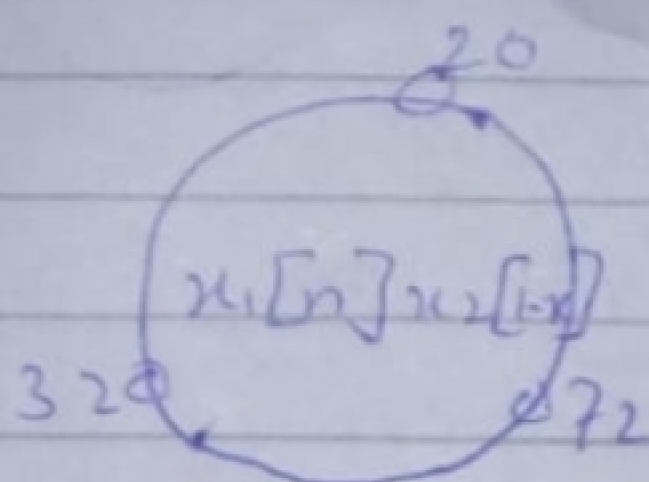
(3) Sum $y = 124$

Now we shift the Folded Sequences Anti clockwise

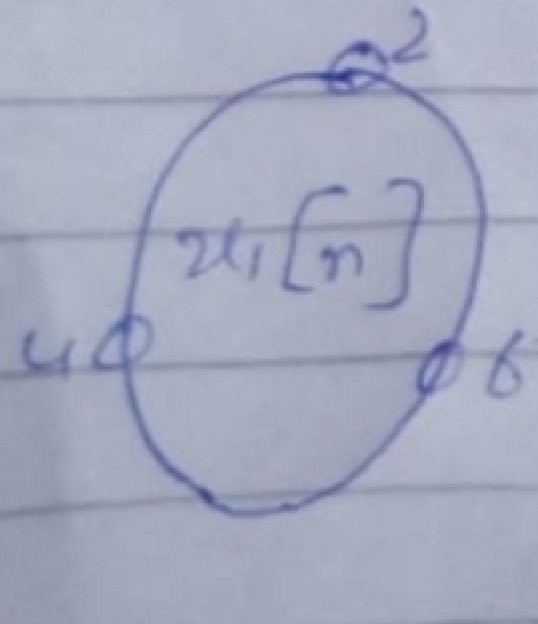


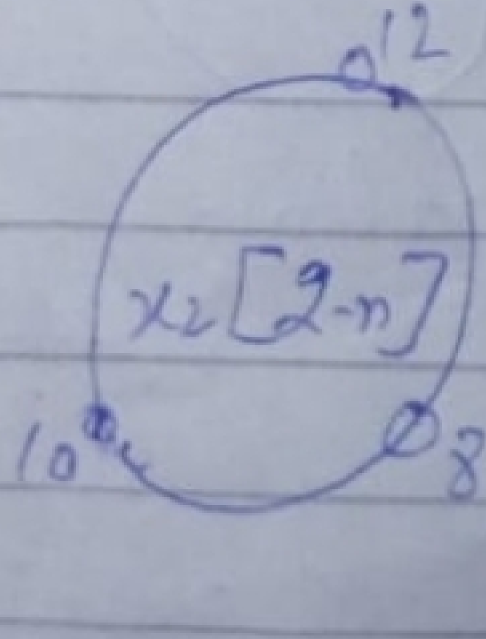
(4) multiplication =>



Sum $y[1] = 124$

Second shift





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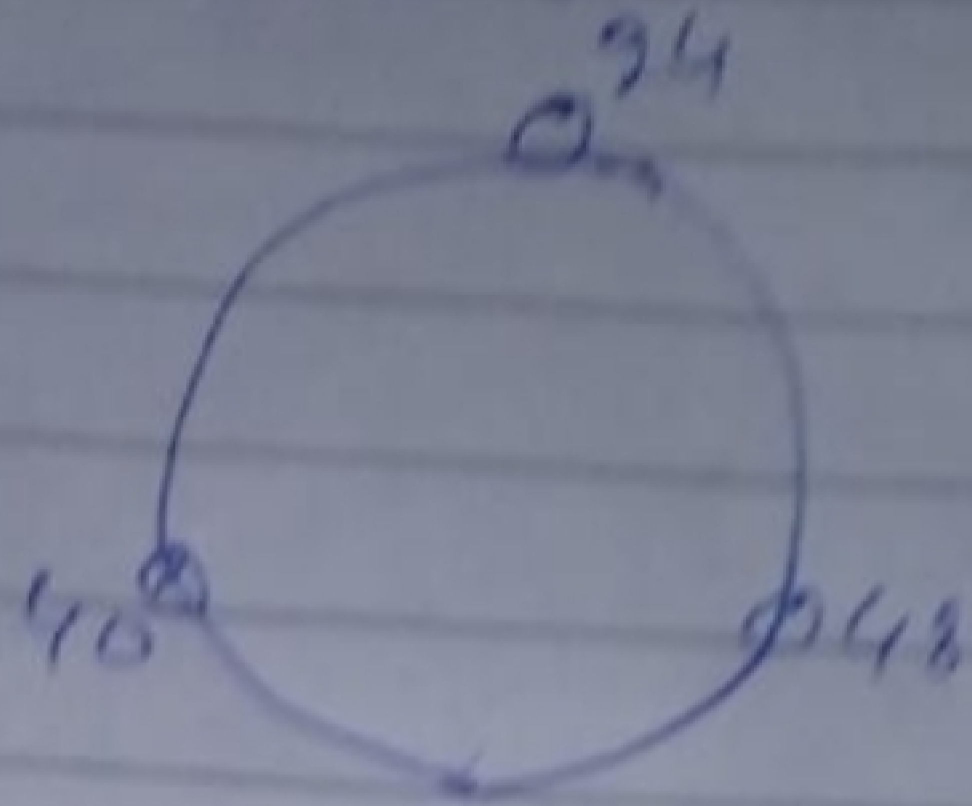
multiplication :=>



Sum = $y[2] = 112$

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