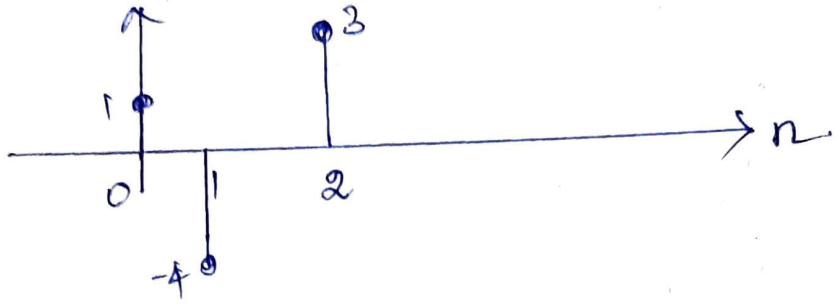
Some Interesting Problems

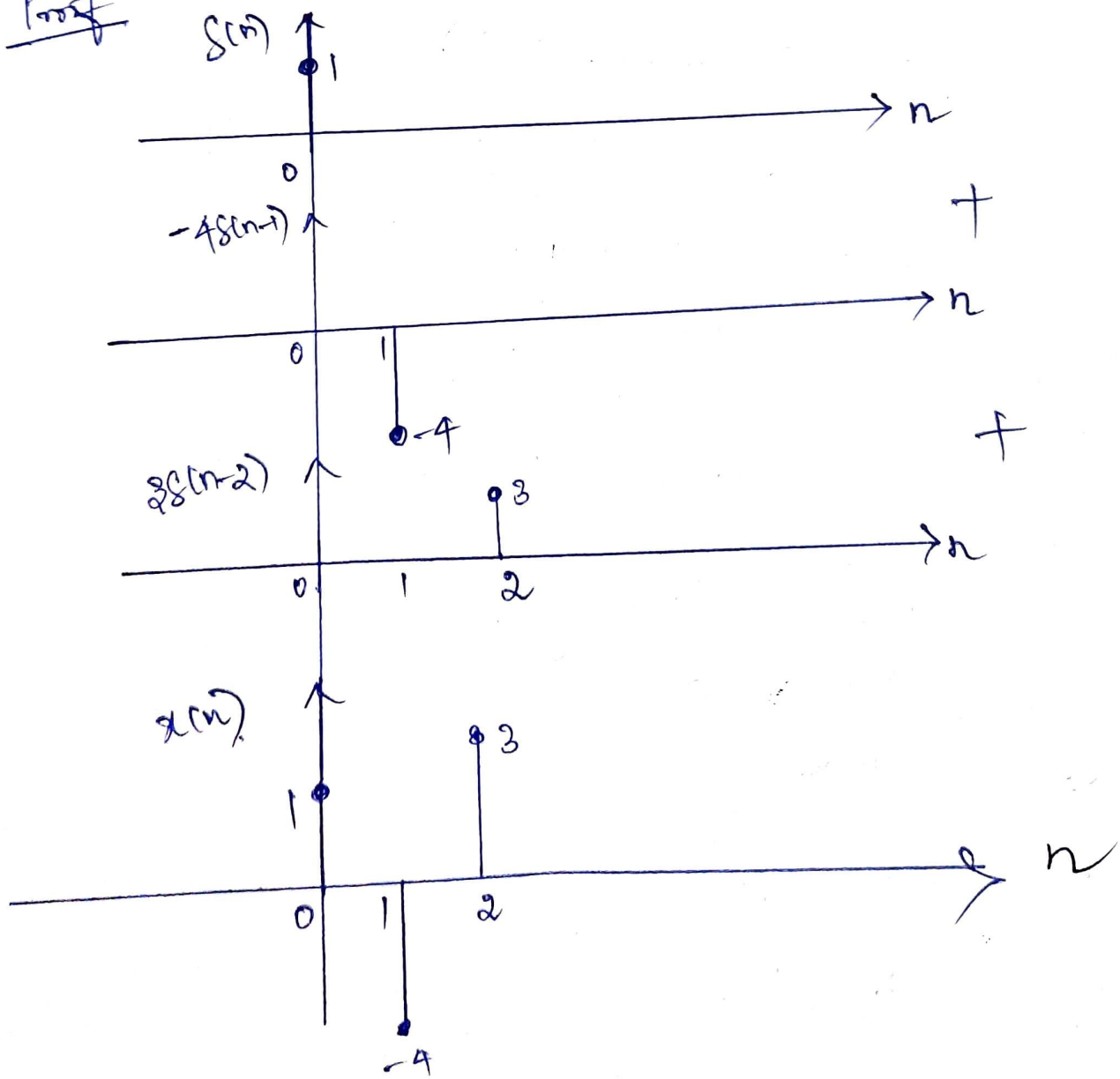
(1) Given $x(n) = \{1, -4, 3\}$, Represent $x(n)$ interms of weighted shifted Impulse functions.

→ Given $x(n)$

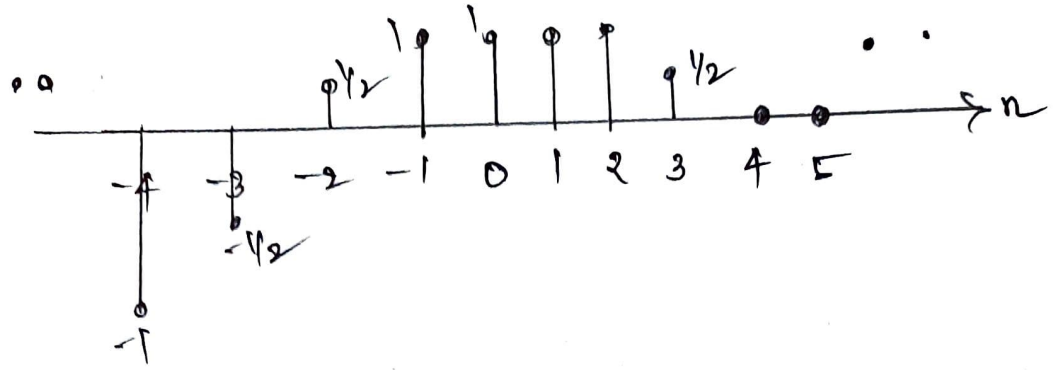


So $x(n) = \delta(n) + 4\delta(n-1) + 3\delta(n-2)$

Proof



(2) Sketch the signal. x(n) given below



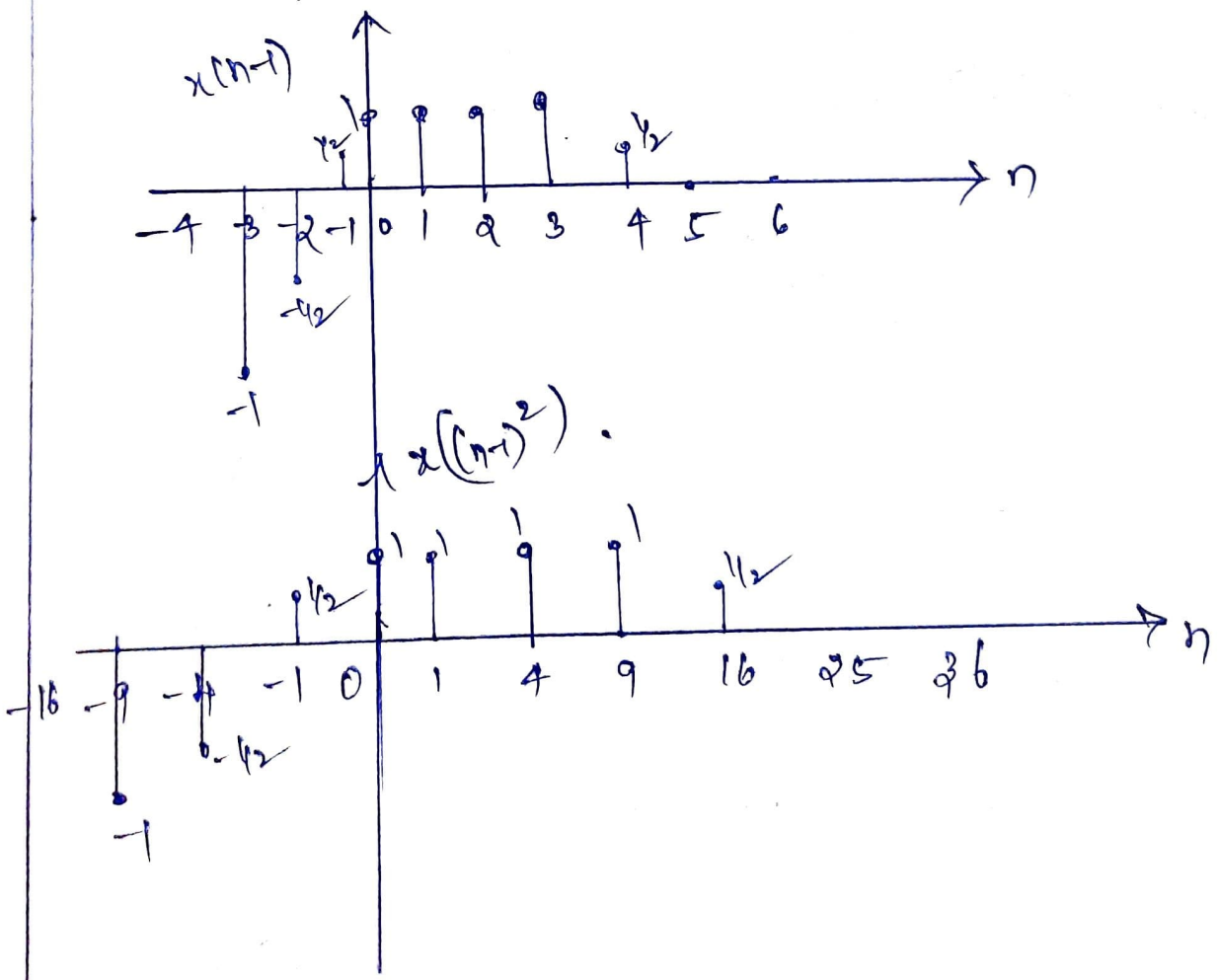
(a) $x((n-1)^2)$

(b) $\{x(n) + x(-n)\}\,\delta(n-1)$

→ (a) $x((n-1)^2)$

→ Step 1: $x(n-1)$ → Right shift x(n) by 1 units.

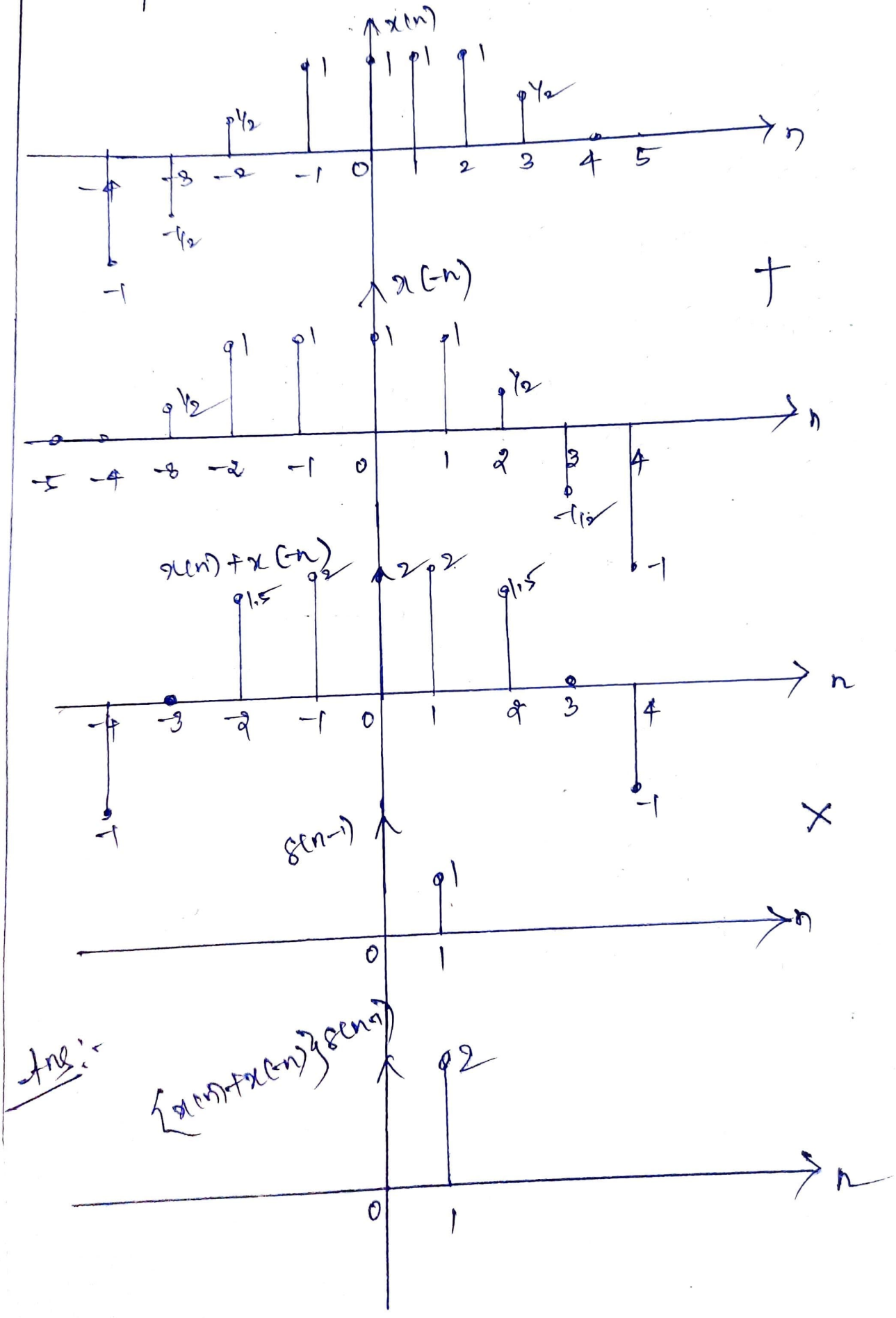
Step 2: $x((n-1)^2)$ → Square the time axis values.



(b) $\{x(n) + x(-n)\}\,\delta(n-1)$

Step 1: $x(n) + x(-n)$

Step 2: $x(n) + x(-n) \times \delta(n-1)$



classification of Signals

(1) Determine whether periodic / Aperiodic.

$$x(n) = \sin\left(\frac{n\pi}{3}\right) \cos\left(\frac{n\pi}{3}\right)$$

→ WKT $\sin A \cos B = \frac{\sin(A+B) + \sin(A-B)}{2}$.

$$x(n) = \frac{\sin\left(\frac{n\pi}{3} + \frac{n\pi}{3}\right) + \sin\left(\frac{n\pi}{3} - \frac{n\pi}{3}\right)}{2}$$

$$= \frac{\sin\left(\frac{2n\pi}{3}\right) + \sin(0)}{2}$$

$$x(n) = \frac{\sin\left(\frac{2n\pi}{3}\right)}{2} \qquad [\text{WKT } \sin(0) = 0]$$

$$x(n) = \frac{1}{2}\sin\left(\frac{2n\pi}{3}\right)$$

$\omega = \frac{2\pi}{N} = \frac{2\pi}{3}$; $\boxed{N = 3}$ is Rational No so $x(n)$ is Periodic &

Period $\boxed{N = 3.}$