

1) $0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100$ $\rightarrow a = \frac{1}{2}, c = 0 \rightarrow 1 = \frac{1}{2}(1)^2 + b(1) + 0 \rightarrow b = \frac{1}{2}$ ✓

$a_n = \frac{1}{2}n^2 - \frac{1}{2}n \rightarrow a_1 = \frac{1}{2}(1)^2 - \frac{1}{2}(1) = 0$ ✓

2) $0, 0, 1, 0, 4 \rightarrow a = \frac{1}{2}, c = 0 \rightarrow 0 = \frac{1}{2}(1)^2 + b(1) + 0 \rightarrow b = -\frac{1}{2} \rightarrow a_n = \frac{1}{2}n^2 - \frac{1}{2}n$ ✓

$b_5 = \frac{1}{2}n(n-1)$

$110 = n(n-1) \rightarrow n = 11$ ✓

3) $0, 1, 3 \rightarrow \{n+1\}$ ✓

$4(11) + 1 = 45$ ✓

$4(11) - 1 = 43$ ✓

4) $a_n = \frac{(-1)^n}{n} \rightarrow (-1) \left(\frac{1}{2} \right) = -\frac{1}{2}, \frac{1}{2}, \dots \rightarrow \frac{1}{2} - (-1) = \frac{3}{2}$ ✓

5) $b_n = (-2)^n - n \rightarrow b_5 = (-2)^5 - 5 = -32 - 5 = -37$ ✓

6) $a_1 - a_9 = 12 \rightarrow 4r + 16d - a_1 = 12 \rightarrow 16d = 12 - d = 12 \rightarrow a_7 - a_1 = a_1 + 6d - a_1 = 6d = 12 \rightarrow d = 2$ ✓

7) $a_1 = 1$ ✓

$a_5 = a_1 + 4d = 15$ ✓

$-2d = -1 \rightarrow d = \frac{1}{2}$ ✓

$a_n = 5n - 1 \rightarrow a_{11} = 5(11) - 1 = 54$ ✓

8) $2, 4, 6, 8, 10, 12 \rightarrow a_n = 2n$ ✓

$8, 9, 10, 11 \rightarrow b_n = n + 7$ ✓

$a_n = 2n \rightarrow \frac{2n-2}{2n+2} \rightarrow \frac{2n-2}{2n+2} \left(\frac{1}{2} \right) \rightarrow 1n - 2 \left(4n + 9 \right)$ ✓

$$\begin{aligned} & \textcircled{0} \quad \underbrace{a_0 a_1 a_2 a_3}_{+a_3 + a_2 + a_1 + a_0} \rightarrow a = -\frac{p}{L}, c = 0 \rightarrow a = -\frac{p}{L} (1)^4 + b(1) + 0 = b = \frac{1}{L} \\ & \quad \underbrace{-c}_{-c} \quad \underbrace{-c}_{-c} \quad \underbrace{-c}_{-c} \end{aligned}$$

$$a_n = -\frac{p}{L} n^4 + \frac{1}{L} n \rightarrow n(-\frac{p}{L}) + b(\frac{1}{L}) = 0 \quad \checkmark$$

$$\begin{aligned} & \textcircled{C} \quad \underbrace{-a_0 - a_1 - a_2}_{+a_3 + a_2 + a_1 + a_0} \rightarrow a = 1, c = b \rightarrow -a = \\ & \quad \underbrace{+a_3}_{+a_3} \quad \underbrace{+a_2}_{+a_2} \quad \underbrace{+a_1}_{+a_1} \quad \underbrace{+a_0}_{+a_0} \end{aligned}$$

$$-a = 1(1) + b(1) - a$$

$$b = -1$$

$$a_n = n^4 - n - 1$$

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$$\begin{aligned} a_0 &= a + r + r^2 = 21 \\ a_1 &= r^2 \\ r^2 &= 10 \rightarrow r = \sqrt{10} \end{aligned}$$

$$\rightarrow b n^2 + r n + r^2$$

$$n^4 - n - 1 = 8n + r^2$$

$$n(n^3 - 1) = r^2 \rightarrow n = 1 \quad \checkmark$$

$$a_n = b n^2 + r n + r^2 = 10$$