

(سوال 1)

$$1, 5, 12, 22, \dots \Rightarrow \alpha_n = n^2 + \left(\frac{n(n-1)}{2}\right) \quad \alpha_{10} = 100 + 45 = 145$$

$\downarrow \quad \downarrow \quad \downarrow$
 $1^2 + \left(\frac{1(1-1)}{2}\right) \quad 2^2 + \left(\frac{2(2-1)}{2}\right) \quad 3^2 + \left(\frac{3(3-1)}{2}\right)$

(سوال 2)

$$0, 1, 3, \dots \Rightarrow \alpha_n = \frac{n(n-1)}{2} = 55 \Rightarrow n(n-1) = 110 \Rightarrow \boxed{n=11}$$

$\leftarrow \quad \leftarrow \quad \leftarrow$
 $\frac{1(1)}{2} \quad \frac{2(2)}{2} \quad \frac{3(3)}{2}$

(سوال 3)

$$5, 9, 13, \dots \Rightarrow \alpha_n = 4n+1 \rightarrow \alpha_{11} = 4 \times 11 + 1 = 45$$

$\leftarrow \quad \leftarrow \quad \leftarrow$
 $(1 \times 4) + 1 \quad (2 \times 4) + 1 \quad (3 \times 4) + 1$

$$5, 13, 21, \dots \Rightarrow \alpha_n = 8n-3 \rightarrow \alpha_{11} = 85$$

(سوال 4)

$$\alpha_n = \frac{(-1)^n}{n} \Rightarrow -1, \frac{1}{2}, -\frac{1}{3}, \frac{1}{4}, -\frac{1}{5}, \dots \Rightarrow \frac{1}{2} + 1 = \frac{3}{2}$$

$\leftarrow \quad \leftarrow \quad \leftarrow \quad \leftarrow \quad \leftarrow$
 $\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{1}{5}$

(سوال 5) $b_n = (-3)^n - 7n \xrightarrow{n=3} -27 - 21 = -48$

$$\alpha_n = -5n + 22 \rightarrow -5k + 22 = -48 \rightarrow -5k = -70 \rightarrow k = 14$$

(سوال 6) $\alpha_n = an + b \rightarrow 10a + b - 7a - b = 12 \rightarrow 3a = 12 \rightarrow \boxed{a=4}$

$$\Rightarrow \alpha_4 - \alpha_1 \Rightarrow 4d + 5d - a_1 \rightarrow 5d \rightarrow 5 \times 4 = 20$$

(سوال 7) $\alpha_1 = 7 \rightarrow \begin{cases} 2d + b = 7 \rightarrow -2d - 2b = -14 \\ 4d + b = 15 \rightarrow 4d + b = 15 \end{cases}$

$$\alpha_4 = 15 \rightarrow \begin{cases} 2d + b = 7 \rightarrow -2d - 2b = -14 \\ 4d + b = 15 \rightarrow 4d + b = 15 \end{cases}$$

$$-b = 11 \rightarrow \boxed{b=-11} \quad \boxed{a=4}$$

$$\Rightarrow \alpha_1 = b_1 \rightarrow 4 + (-11) = b_1 \Rightarrow b_1 = -7$$

$\alpha_n = b_n \rightarrow (3 \times 4) - 11 = 11 \rightarrow b_3 = 11$

$$b_n \rightarrow 3, 11, \dots \rightarrow \boxed{b_n = 8n - 5}$$

$$t_n = \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \frac{1}{1}, \dots$$

(سؤال ٨)

$$a_n = \frac{F_n - 1}{F_n + 1} \rightarrow \frac{F_n - 1}{F_n + 1} < \frac{1}{2} \rightarrow F_n - 1 < \frac{1}{2}(F_n + 1) \rightarrow F_n < 1.5 \rightarrow n < \frac{1.5}{1} \rightarrow n < 1.5$$

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$$t_n = 4, 9, 16, 25, \dots$$

$$t_n = An^2 + Bn$$

$$\text{حل: } 3A + 2B$$

(سؤال ٩)

$$-1^2 \rightarrow a = \frac{-1}{1} = -1$$

$$t_1 = -1 + B = 4 \quad B = 5$$

$$\Rightarrow 3A + 2B = 13$$

$$t_n = -1, -4, -9, \dots \quad an^2 + bn + c \Rightarrow n^2 - n - 1$$

(سؤال ١٠)

$$+1 \Rightarrow \boxed{a=1}$$

$$t_1 = 1 + b + c = -1$$

$$t_2 = 4 + 2b + c = -4$$

$$\Rightarrow \begin{cases} -b + c = -2 \\ 2b + c = -8 \end{cases} \Rightarrow \begin{cases} b = -1 \\ c = -1 \end{cases}$$

$$a_n = an + b \rightarrow \begin{cases} a_1 = a + b = 1 \\ a_2 = a + 2b = 4 \end{cases} \rightarrow \begin{cases} d = 1 \\ a_1 = 1 \end{cases} \rightarrow a_n = 1 + (n-1)1 = n$$

$2d = 1$

$$n^2 - n - 1 = 0 \rightarrow n^2 - n - 1 = 0 \rightarrow (n-1)(n+1) = 0 \rightarrow \begin{cases} n=1 \checkmark \\ n=-1 \times \end{cases}$$