

(الف) $y = \underset{a=1}{x^2} + \underset{b}{4x} + \underset{c}{5}$ $\text{ent} \left \begin{array}{l} \frac{-b}{2a} \rightarrow \frac{-4}{2} = -2 \\ \frac{-\Delta}{4a} \rightarrow \frac{-14}{4} = -3.5 \end{array} \right. \Rightarrow \begin{bmatrix} -2 \\ -3.5 \end{bmatrix}$ $\Delta = b^2 - 4ac \rightarrow 4^2 - 4 \times 1 \times 5 = 14$ $a > 0 \rightarrow \text{Min}$ $\text{Min} \left \begin{array}{l} -2 \\ -3.5 \end{array} \right.$ 	1
(الف) $y = \underset{a}{-x} + \underset{b}{4x} + \underset{c}{-3}$ $\text{ent} \left \begin{array}{l} \frac{-b}{2a} \rightarrow \frac{-4}{-2} = 2 \\ \frac{-\Delta}{4a} \rightarrow \frac{-1}{-4} = 0.25 \end{array} \right. \Rightarrow \begin{bmatrix} 2 \\ 0.25 \end{bmatrix}$ $\Delta = b^2 - 4ac = 14 - (4 \times -1 \times -3) = 4$ $a < 0 \rightarrow \text{Max}$ $\text{Max} \left \begin{array}{l} 2 \\ 0.25 \end{array} \right.$  (ب) $-x^2 + 4x - 3 = 0 \rightarrow x^2 - 4x + 3 = 0$ $(x-1)(x-3) = 0 \rightarrow x = 1, x = 3$ در نقاط $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ و $\begin{bmatrix} 3 \\ 0 \end{bmatrix}$ قطع می‌کند.	2
(الف) $\Delta > 0$ $a = 2$ $b = -3$ $c = a$ $\Delta = (-3)^2 - 4(2)(a) \rightarrow \Delta = 9 - 8a$ $9 - 8a > 0 \wedge a < 9$ $a < \frac{9}{8}$ $ax^2 + bx + c = 0$ (ب) $\Delta = 0$ $\Delta = (-3)^2 - 4(2)(a) \rightarrow \Delta = 9 - 8a$ $9 - 8a = 0 \wedge a = 9$ $a = \frac{9}{8}$ (ج) $\Delta < 0$ $\Delta = (-3)^2 - 4(2)(a) \rightarrow \Delta = 9 - 8a$ $9 - 8a < 0 \wedge a > 9$ $a > \frac{9}{8}$ (د) $\Delta = (-3)^2 - 4(2)(a) \rightarrow \Delta = 9 - 8a$ $\Delta \geq 0$ $9 - 8a \geq 0 \wedge a \leq 9$ $a \leq \frac{9}{8}$	3
(الف) $x^2 - 2x - 1 = 0$ $x^2 - 2x = 1$ $x^2 + 2x + 1 = 1 + 1$ $(x-1)^2 = 2$ $x - 1 = \pm \sqrt{2}$ $x = 1 \pm \sqrt{2}$ (ب) $x^2 - x - 1 = 0$ $x^2 - x = 1$ $x^2 - x + \frac{1}{4} = 1 + \frac{1}{4}$ $(x - \frac{1}{2})^2 = \frac{5}{4}$ $x - \frac{1}{2} = \pm \sqrt{\frac{5}{4}}$ $x - \frac{1}{2} = \pm \frac{\sqrt{5}}{2}$ $x = \frac{1}{2} \pm \frac{\sqrt{5}}{2}$	4
(الف) $x^2 - 2x - 1 = 0 \rightarrow a = 1$ $b = -2$ $c = -1$ $\Delta = b^2 - 4ac$ $\Delta = (-2)^2 - 4(1)(-1) \rightarrow \Delta = 4 + 4 = 8$ $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-2) \pm \sqrt{8}}{2}$ $x = \frac{2 \pm 2\sqrt{2}}{2} \rightarrow x = 1 \pm \sqrt{2}$ (ب) $x^2 + x - 4 = 0$ $a = 1$ $b = 1$ $c = -4$ $\Delta = b^2 - 4ac$ $\Delta = 1^2 - 4(1)(-4) = 1 + 16 = 17$ $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm \sqrt{17}}{2}$	5

$$n^2 - 11n + 28 = 0 \quad (n-7)(n-4) \rightarrow n=7 \quad (\text{الف})$$

مجموع ضرب

$$\rightarrow n=4$$

$$n^2 + 3n - 28 = 0 \quad (n+7)(n-4) \rightarrow n=-7 \quad (\text{ب})$$

$$\rightarrow n=4$$

$$2n^2 - 12n + 17 = 0 \rightarrow n^2 - 6n + 8.5 = 0 \rightarrow (n-2)(n-4) \quad (\text{الف})$$

$$n = \frac{2}{1} = 2, \quad n = \frac{4}{1} = 4$$

$$3n^2 - 10n + 7 = 0 \rightarrow n^2 - 10n + 21 = 0 \rightarrow (n-3)(n-7) \quad (\text{ب})$$

$$n = \frac{3}{1} = 3, \quad n = \frac{7}{1} = 7$$

$$2n^2 - 5n + 3 = 0 \rightarrow n=1 \quad (\text{الف})$$

$$\rightarrow n = \frac{3}{2} = 1.5$$

$$2n^2 + 5n + 3 = 0 \rightarrow n=-1 \quad (\text{ب})$$

$$\rightarrow n = -\frac{3}{2} = -1.5$$

$$2n^2 - 5n + 1 = 0 \rightarrow a=2, b=-5, c=1 \quad \Delta = b^2 - 4ac = (-5)^2 - 4 \times 2 \times 1 = 17$$

$$n = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-5) \pm \sqrt{17}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$7n^2 + 7n + 9 = 0 \rightarrow \Delta = (7)^2 - 4 \times 7 \times 9 = -95 \quad \Delta < 0 \quad \text{X} \quad \text{جواب ندارد} \quad (\text{ج})$$

$$n^2 - 3n - 2 = 0 \quad \text{مجموع } S = \frac{-b}{a} = 3 \quad \text{ضرب } P = \frac{c}{a} = -2 \quad (\text{الف})$$

$$S = \frac{-(-3)}{1} = 3 \quad P = \frac{-2}{1} = -2$$

$$S^2 - 2P = 3^2 - 2 \times (-2) = 9 - (-4) = 13$$

$$S^3 - 3P = 3^3 - 3(-2) = 27 - (-6) = 33 \quad (\text{ب})$$

$$\binom{n}{r} = \frac{n!}{r!(n-r)!} \quad \binom{7}{5} = \frac{7!}{5!(7-5)!} = \frac{7!}{5! \times 2!} = \frac{7 \times 6}{2 \times 1} = 21 \quad (\text{الف})$$

$$\binom{9}{2} = \frac{9!}{2!(9-2)!} = \frac{9 \times 8}{2 \times 1} = 36 \quad \binom{7}{5} + \binom{9}{2} = 21 + 36 = 57$$

$$\frac{9!}{3!(9-3)!} = \frac{9 \times 8 \times 7}{3 \times 2 \times 1} = 84 \quad \binom{8}{2} = \frac{8!}{2!(8-2)!} = \frac{8 \times 7}{2 \times 1} = 28 \quad (\text{ب})$$

$$\binom{9}{3} - \binom{8}{2} = 84 - 28 = 56$$