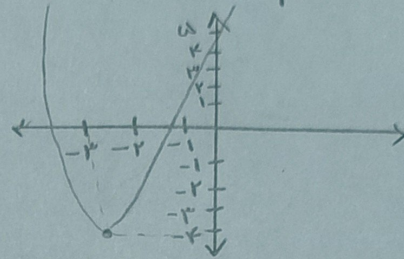


$$-\frac{b}{2a} = -\frac{4}{2} = -2$$

$$-\frac{\Delta}{4a} = -\frac{16 - 4(1 \times 4)}{4} = -4$$

$$\text{Min} \begin{cases} -4 \\ -4 \end{cases}$$

(الف)



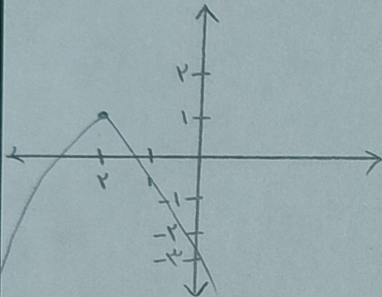
(ب)

$$-\frac{b}{2a} = -\frac{4}{-2} = 2$$

$$-\frac{\Delta}{4a} = -\frac{16 - 4(-1 \times 4)}{-4} = 1$$

$$\text{Max} \begin{cases} 1 \\ 1 \end{cases}$$

(الف)



(ب) $\begin{bmatrix} \square \\ 0 \end{bmatrix} \Rightarrow x^2 + 4x - 4 = 0 \xrightarrow{x=1} x^2 - 4x + 4 = 0$
 $\Rightarrow (x-1)(x-3) \Rightarrow x=3, x=1 \Rightarrow \text{نقاط تلاقی}$

(الف) $a > 0 \Leftrightarrow (-3)^2 - 4 \times 2 \times a = 1 \times a \quad \Delta > 0$

(ب) $a = \{0\} \Leftrightarrow (-3)^2 - 4 \times 2 \times a = 1 \times a \quad \Delta = 0$

(ج) $a < 0 \Leftrightarrow (-3)^2 - 4 \times 2 \times a = 1 \times a \quad \Delta < 0$

(د) $a \geq 0 \Leftrightarrow (-3)^2 - 4 \times 2 \times a = 1 \times a \quad \Delta \geq 0$

(الف) $x^2 - 2x - 1 = 0 \xrightarrow{+1} x^2 - 2x + 1 = 2 \Rightarrow (x-1)^2 = 2 \Rightarrow x-1 = \sqrt{2}$

$\Rightarrow x = 1 + \sqrt{2} \quad \text{و} \quad x = 1 - \sqrt{2}$

(ب) $x^2 - x - 1 = 0 \Rightarrow x^2 - x + \frac{1}{4} = 1 + \frac{1}{4} \Rightarrow (x - \frac{1}{2})^2 = \frac{5}{4} \Rightarrow x - \frac{1}{2} = \pm \sqrt{\frac{5}{4}}$

$x - \frac{1}{2} = \pm \frac{\sqrt{5}}{2} \Rightarrow x = \frac{1}{2} \pm \frac{\sqrt{5}}{2} \Rightarrow x = \frac{1}{2} + \frac{\sqrt{5}}{2} \quad \text{و} \quad \frac{1}{2} - \frac{\sqrt{5}}{2}$

(الف) $x^2 - 2x - 1 = 0$

$\Delta = b^2 - 4ac \Rightarrow (-2)^2 - 4(1 \times -1) = 12$

$x = \frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2} = 1 \pm \sqrt{3}$

(ب) $x^2 + x - 4 = 0$

$\Delta = 1 - 4(1 \times -4) = 17$

$x = \frac{-1 \pm \sqrt{17}}{2} = \frac{-1 + \sqrt{17}}{2} \quad \text{و} \quad \frac{-1 - \sqrt{17}}{2}$

$$\text{الف) } x^2 - 11x + 18 = 0 \Rightarrow (x-4)(x-7) \begin{cases} x=4 \\ x=7 \end{cases}$$

$$\text{ب) } x^2 + 3x - 18 = 0 \Rightarrow (x-4)(x+7) \begin{cases} x=-7 \\ x=4 \end{cases}$$

$$\text{الف) } \Delta x^2 - 12x + V = 0 \Rightarrow x^2 - 12x + 3\Delta = 0 \Rightarrow (x-7)(x-\Delta) \Rightarrow$$

$$x = \frac{\Delta}{\Delta} = 1 \quad \underline{\quad} \quad x = \frac{V}{\Delta}$$

$$\text{ب) } 3x^2 - 10x + V = 0 \Rightarrow x^2 - 10x + 21 = 0 \Rightarrow (x-3)(x-7) \Rightarrow$$

$$x = \frac{3}{3} = 1 \quad \underline{\quad} \quad x = \frac{V}{3}$$

$$\text{الف) } 2x^2 - 5x + 3 = 0 \Rightarrow a+b+c=0 \Rightarrow x=1 \quad \underline{\quad} \quad x = \frac{c}{a} = \frac{3}{2}$$

$$\text{ب) } 2x^2 + 5x + 3 = 0 \Rightarrow c+a=b \Rightarrow x=-1 \quad \underline{\quad} \quad x = -\frac{c}{a} = -\frac{3}{2}$$

$$\text{ج) } 2x^2 - 5x + 1 = 0 \Rightarrow \Delta = 25 - 8 = 17 \quad x = \frac{5 \pm \sqrt{17}}{4} \Rightarrow x = \frac{5 + \sqrt{17}}{4} \quad \underline{\quad} \quad x = \frac{5 - \sqrt{17}}{4}$$

$$\text{د) } 4x^2 + 7x + 9 = 0 \Rightarrow \Delta = 49 - 144 = -95 \quad \text{ليس حقيقيًا، لذا لا يوجد حل}$$

$$\text{الف) } S^2 - 2P = 3^2 - \frac{2 \times 18 - 2}{4} = 13$$

$$S = -\frac{b}{a} = -\frac{-3}{1} = 3 \quad / \quad P = \frac{c}{a} = \frac{-2}{1} = -2$$

$$\text{ب) } S^3 - 3SP = (3)^3 - 3\left(\frac{3 \times 18 - 2}{4}\right) = 27 + 18 = 45$$

$$\text{الف) } \begin{pmatrix} V \\ \Delta \end{pmatrix} + \begin{pmatrix} 9 \\ 2 \end{pmatrix} = \frac{3 \times 4 \times 5 \times 9 \times V}{5!} + \frac{1 \times 9}{2!} = \frac{2\Delta 3!}{1!} + \frac{V 2 \times 9!}{2 \times 9!} - \frac{2\Delta 2! + 4 \times 3!}{1!} = \frac{9 \times 3!}{1!} = 54$$

$$\text{ب) } \begin{pmatrix} 9 \\ 3 \end{pmatrix} - \begin{pmatrix} 18 \\ 2 \end{pmatrix} = \frac{V \times 18 \times 9}{3!} - \frac{V \times 18}{2!} = \frac{504}{6} - \frac{504 \times 3}{2 \times 3} = \frac{504 - 1512}{6} = \frac{-1008}{6} = -168$$