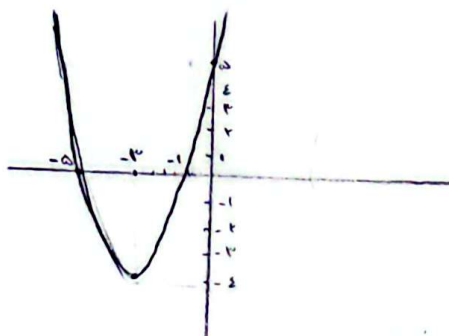


$$\text{Min} \left\{ \begin{array}{l} \frac{-b}{2a} = -2 \leftarrow \frac{-b}{2a} \\ -4 \end{array} \right.$$

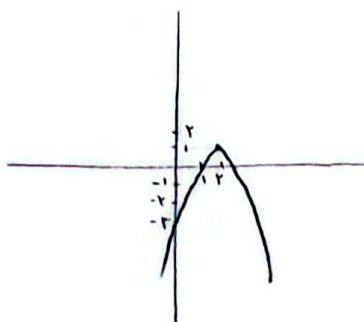
$$y = (-2)^2 + 4x + 5 = -4$$



1

$$\text{Max} \left\{ \begin{array}{l} \frac{-b}{2a} = \frac{-4}{-2} = 2 \\ 1 \end{array} \right.$$

$$y = -4 + 4 - 2 = 1$$



$$y = -x^2 + 4x - 4$$

$$-1 + 4 - 4 = 0$$

$$x = 1$$

$$x = \frac{c}{a} = \frac{-4}{-1} = 4$$

عدد x ها را در نقاط 1 و 4 قطع می کند.

2

$$\text{الف) } a = 1 \rightarrow 2x^2 - 4x + 1 = 0 \rightarrow 2x^2 - 4x + 1 = 0 \rightarrow \begin{cases} x = 1 \\ x = \frac{c}{a} = \frac{1}{2} \end{cases} \rightarrow \Delta > 0$$

$$\text{ب) } \Delta = 0 \rightarrow b^2 - 4ac = 0 \rightarrow 4 - 4c = 0 \rightarrow 4 - 4c = 0 \rightarrow 4 = 4c \rightarrow a = \frac{4}{c} \rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{2 \pm 0}{2} = 1 \rightarrow x = \frac{2}{2} = 1$$

3

$$\text{ج) } \Delta < 0 \rightarrow b^2 - 4ac = 4 - 4a = 4 - 4 = 0 \rightarrow a = 1 \rightarrow \text{ریشه حقیقی ندارد.} \rightarrow a = 2$$

$$\text{د) } \Delta > 0 \rightarrow a = -2 \rightarrow b^2 - 4ac = 4 - 4a = 4 + 4 = 8 \rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{2 \pm \sqrt{8}}{-4} = \begin{cases} x = \frac{2 + \sqrt{8}}{-4} \\ x = \frac{2 - \sqrt{8}}{-4} \end{cases}$$

$$\text{الف) } x^2 - 2x - \frac{1}{2} = 0 \rightarrow x^2 - 2x + 1 = 2 \rightarrow (x-1)^2 = 2 \rightarrow x-1 = \pm \sqrt{2} \rightarrow x = \pm \sqrt{2} + 1$$

4

$$\text{ب) } x^2 - x - 1 = 0 \rightarrow x^2 - x + 1 + \frac{1}{x} = 1 + \frac{1}{x} \rightarrow x^2 - x + \frac{1}{x} = \frac{1}{x} \rightarrow \sqrt{(x - \frac{1}{x})^2} = \sqrt{\frac{1}{x^2}} \rightarrow x - \frac{1}{x} = \pm \frac{1}{x} \rightarrow \begin{cases} x - \frac{1}{x} = \frac{1}{x} \rightarrow x = \frac{1 + \sqrt{5}}{2} \\ x - \frac{1}{x} = -\frac{1}{x} \rightarrow x = \frac{1 - \sqrt{5}}{2} \end{cases}$$

$$\text{الف) } x^2 - 2x - 1 = 0 \rightarrow x = \frac{2 \pm \sqrt{4 - 4(-1)}}{2} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = \frac{2(1 \pm \sqrt{2})}{2} = \begin{cases} 1 + \sqrt{2} \\ 1 - \sqrt{2} \end{cases}$$

5

$$\text{ب) } x^2 + x - 4 = 0 \rightarrow x = \frac{-1 \pm \sqrt{1 + 16}}{2} = \begin{cases} x = \frac{-1 + \sqrt{17}}{2} \\ x = \frac{-1 - \sqrt{17}}{2} \end{cases}$$

$$\text{الف) } x^2 - 11x + 28 = 0 \rightarrow (x-4)(x-7) = 0 \begin{cases} x-4=0 \rightarrow x=4 \\ x-7=0 \rightarrow x=7 \end{cases}$$

$$\text{ب) } x^2 + 3x - 28 = 0 \rightarrow (x-4)(x+7) = 0 \begin{cases} x-4=0 \rightarrow x=4 \\ x+7=0 \rightarrow x=-7 \end{cases}$$

$$\text{الف) } 5x^2 - 12x + 7 = 0 \rightarrow x^2 - 12x + 35 = 0 \rightarrow (x-5)(x-7) = 0 \begin{cases} x-5=0 \rightarrow x=\frac{5}{5} \rightarrow x=1 \\ x-7=0 \rightarrow x=\frac{7}{5} \end{cases}$$

$$\text{ب) } 3x^2 - 10x + 7 = 0 \rightarrow x^2 - 10x + 21 = 0 \rightarrow (x-3)(x-7) = 0 \begin{cases} x-3=0 \rightarrow x=\frac{3}{3} \rightarrow x=1 \\ x-7=0 \rightarrow x=\frac{7}{3} \end{cases}$$

$$\text{الف) } 2x^2 - 5x + 3 = 0 \rightarrow 2+3-5=0 \begin{cases} x=1 \\ x=\frac{c}{a} = \frac{3}{2} \end{cases}$$

$$\text{ب) } 2x^2 + 5x + 3 = 0 \rightarrow 2+3=5 \rightarrow (2+3)=5 \rightarrow \begin{cases} x=-1 \\ x=-\frac{c}{a} = -\frac{3}{2} \end{cases}$$

$$\text{ج) } 2x^2 - 5x + 1 = 0 \rightarrow x = \frac{5 \pm \sqrt{25-4}}{2} = \frac{5 \pm \sqrt{21}}{2} \begin{cases} \frac{5+\sqrt{21}}{2} \\ \frac{5-\sqrt{21}}{2} \end{cases}$$

$$\text{د) } 4x^2 + 4x + 9 = 0 \rightarrow x = \frac{-4 \pm \sqrt{16-144}}{8} = \frac{-4 \pm \sqrt{-128}}{8} \rightarrow \text{جواب ندارد}$$

$$x^2 - 13x - 2 = 0 \rightarrow x = \frac{13 \pm \sqrt{169+8}}{2} \begin{cases} x = \frac{13+\sqrt{177}}{2} \\ x = \frac{13-\sqrt{177}}{2} \end{cases}$$

$$S = \frac{13-\sqrt{177} + 13+\sqrt{177}}{2} = \frac{26}{2} = 13$$

$$P = \frac{13-\sqrt{177}}{2} \times \frac{13+\sqrt{177}}{2} = \frac{-1}{4} = -\frac{1}{4}$$

$$\text{الف) } S^2 - 2P = 13^2 - (2 \times -\frac{1}{4}) = 169 - (-\frac{1}{2}) = 169\frac{1}{2}$$

$$\text{ب) } S^2 - 2SP = 13^2 - (2 \times \frac{13-\sqrt{177}}{2} \times \frac{13+\sqrt{177}}{2}) = 169 - (-1) = 170$$

$$\text{الف) } \binom{5}{2} + \binom{4}{2} = \frac{5!}{2!3!} + \frac{4!}{2!2!} = \frac{5 \times 4 \times 3!}{2 \times 3!} + \frac{4 \times 3 \times 2!}{2 \times 2!} = \frac{5 \times 4}{2} + \frac{4 \times 3}{2} = 10 + 6 = 16$$

$$\text{ب) } \binom{4}{2} - \binom{1}{2} = \frac{4!}{2!2!} - \frac{1!}{2!} = \frac{4 \times 3 \times 2!}{2 \times 2!} - \frac{1 \times 1!}{2} = \frac{4 \times 3}{2} - \frac{1}{2} = 6 - \frac{1}{2} = 5\frac{1}{2}$$