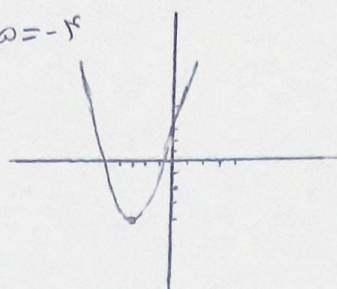


$$y = x^2 + 4x + 5 \xrightarrow{a > 0} \text{Min}$$

$$\text{ext} = \left| \frac{-b}{a} = -2 \right.$$

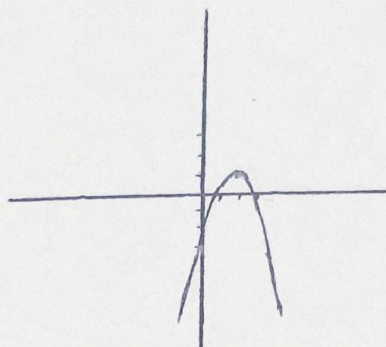
$$(-2)^2 + 4(-2) + 5 = -1$$



$$y = -x^2 + 4x - 3 \xrightarrow{a < 0} \text{Max}$$

$$\text{ext} = \left| \frac{-b}{a} = 2 \right.$$

$$-(2)^2 + 4(2) - 3 = 1$$



$$y = 0 = -x^2 + 4x - 3$$

$$x_1 = \frac{-4 + \sqrt{16 - 12}}{-2} = 1$$

$$x_2 = \frac{-4 - \sqrt{16 - 12}}{-2} = 3$$

$$a = -5 \Rightarrow 2x^2 - 3x + (-5) = 0 \quad x_1 = -1 \quad x_2 = -\frac{5}{2} = -2.5 \quad \text{الف}$$

$$\sqrt{b^2 - 4ac} = 0 \Rightarrow \sqrt{(-3)^2 - 4(2)(-5)} = 0 \Rightarrow a = \frac{9}{4} \quad \text{ب}$$

$$a = 5 \Rightarrow 2x^2 - 3x + 5 = 0 \quad \Delta = \sqrt{(-3)^2 - 4(2)(5)} = \sqrt{-31} \quad \text{ج}$$

$$a = -9 \Rightarrow 2x^2 - 3x + (-9) = 0 \quad \Delta = \sqrt{(-3)^2 - 4(2)(-9)} = \sqrt{81} \quad \text{د}$$

$$\text{اند} \quad x^2 - 2x - 1 = 0 \Rightarrow x^2 - 2x + 1 = +2 \Rightarrow (x-1)^2 = +2 \Rightarrow x-1 = \pm\sqrt{2} \Rightarrow \begin{cases} x = 1 + \sqrt{2} \\ x = 1 - \sqrt{2} \end{cases}$$

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

$$\Rightarrow 2x = 1 \pm \sqrt{0} \Rightarrow x = \begin{cases} \frac{1}{2} + \frac{\sqrt{0}}{2} \\ \frac{1}{2} - \frac{\sqrt{0}}{2} \end{cases}$$

$$\text{و) } x^2 - 2x - 1 = 0 \Rightarrow x_1 = \frac{2 + \sqrt{(-2)^2 - 4(-1)}}{2} = \frac{2 + \sqrt{4}}{2} = \frac{2 + 2}{2} = 1 + \sqrt{2}$$

$$x_2 = \frac{2 - \sqrt{(-2)^2 - 4(-1)}}{2} = \frac{2 - \sqrt{4}}{2} = \frac{2 - 2}{2} = 1 - \sqrt{2}$$

$$\text{ب) } x^2 + x - 5 = 0 \Rightarrow x_1 = \frac{-1 + \sqrt{(1)^2 - 4(-5)}}{2} = \frac{-1 + \sqrt{1 + 20}}{2} = \frac{-1 + \sqrt{21}}{2} = -\frac{1}{2} + \sqrt{\frac{21}{4}}$$

$$x_2 = \frac{-1 - \sqrt{(1)^2 - 4(-5)}}{2} = \frac{-1 - \sqrt{1 + 20}}{2} = \frac{-1 - \sqrt{21}}{2} = -\frac{1}{2} - \sqrt{\frac{21}{4}}$$

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

$$\text{ب) } x^2 + 2x - 24 = 0 \Rightarrow (x+6)(x-4) = 0 \Rightarrow \begin{cases} x=-6 \\ x=4 \end{cases}$$

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

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

$$\text{الف) } 2x^2 - 5x + 2 = 0 \rightarrow x^2 - 5x + 2 = 0 \Rightarrow (x-2)(x-3) = 0 \Rightarrow \begin{cases} x=2 \\ x=3 \end{cases}$$

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

$$\text{ج) } 2x^2 - 5x + 1 = 0 \rightarrow \frac{5 \pm \sqrt{(-5)^2 - 4}}{4} = \frac{5 \pm \sqrt{17}}{4} \Rightarrow \begin{cases} x_1 = \frac{5 + \sqrt{17}}{4} \\ x_2 = \frac{5 - \sqrt{17}}{4} \end{cases}$$

$$\text{د) } 4x^2 + 7x + 9 = 0 \rightarrow \frac{-7 \pm \sqrt{7^2 - 4 \cdot 4 \cdot 9}}{8} = \frac{-7 \pm \sqrt{-95}}{8} \Rightarrow \text{ریشه حقیقی ندارد}$$

$$s = -\frac{b}{a} \quad p = \frac{c}{a} \rightarrow s = -\frac{7}{1} = -7 \quad p = \frac{9}{1} = 9$$

$$\text{الف) } (7)^2 - 2(-7) = 49 + 14 = 63$$

$$\text{ب) } (7)^3 - 3(7)(-7) = 343 + 147 = 490$$

$$\text{الف) } \binom{7}{5} + \binom{9}{2} = \frac{7!}{5!2!} + \frac{9!}{2!7!} = \frac{7 \times 6}{2 \times 1} + \frac{9 \times 8}{2 \times 1} = 21 + 36 = 57$$

$$\text{ب) } \binom{9}{3} - \binom{8}{2} = \frac{9!}{3!6!} - \frac{8!}{2!6!} = \frac{9 \times 8 \times 7}{3 \times 2 \times 1} - \frac{8 \times 7}{2 \times 1} = 84 - 28 = 56$$