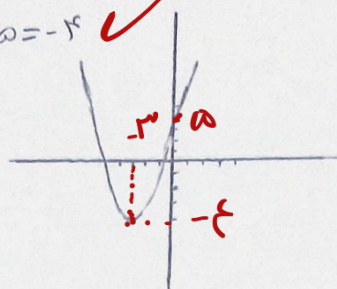


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$$y = x^2 + 4x + \omega \quad a > 0 \rightarrow \text{Min}$$

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

$$(-2)^2 + 4(-2) + \omega = -2 \checkmark$$

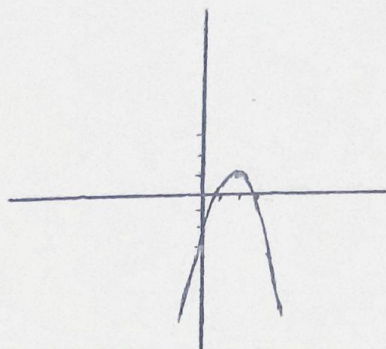


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$$y = -x^2 + 4x - 3 \quad a < 0 \rightarrow \text{Max}$$

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

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



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

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

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

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$$\times a = -\omega \Leftrightarrow 2x^2 - 3x + (-\omega) = 0 \quad x_1 = -1 \quad x_2 = -\frac{\omega}{2} = -2/\omega$$

$$\text{۵۱۵} \quad \sqrt{b^2 - 4ac} = 0 \Rightarrow \sqrt{(-3)^2 - 4a} = 0 \Rightarrow a = \frac{9}{4} \checkmark$$

$$\times a = \omega \Leftrightarrow 2x^2 - 3x + \omega = 0 \quad \Delta = \sqrt{(-3)^2 - 4(2\omega)} = \sqrt{-31}$$

$$\times a = -9 \Leftrightarrow 2x^2 - 3x + (-9) = 0 \quad \Delta = \sqrt{(-3)^2 - 4(2(-9))} = \sqrt{117}$$

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

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

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

$$\text{۱۱) } x^2 - 2x - 1 = 0 \Rightarrow x_1 = \frac{2 + \sqrt{4 - (-4)}}{2} = \frac{2 + \sqrt{8}}{2} = \frac{2 + 2\sqrt{2}}{2} = 1 + \sqrt{2}$$

$$x_2 = \frac{2 - \sqrt{4 - (-4)}}{2} = \frac{2 - \sqrt{8}}{2} = \frac{2 - 2\sqrt{2}}{2} = 1 - \sqrt{2}$$

$$\text{ب) } x^2 + x - 4 = 0 \Rightarrow x_1 = \frac{-1 + \sqrt{1 + 16}}{2} = \frac{-1 + \sqrt{17}}{2} = -\frac{1}{2} + \sqrt{\frac{17}{4}}$$

$$x_2 = \frac{-1 - \sqrt{1 + 16}}{2} = \frac{-1 - \sqrt{17}}{2} = -\frac{1}{2} - \sqrt{\frac{17}{4}}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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