

الف) $x^2 - 4x + 9 = 0 \rightarrow x^2 - 4x + 9 = 1 \xrightarrow{\text{انتقال به یک طرف}} (x-3)^2 = 1 \rightarrow x-3 = \pm 1$

$$\begin{cases} x-3=1 \\ x-3=-1 \end{cases} \Rightarrow \begin{cases} x=4 \\ x=2 \end{cases}$$

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الف) $x^2 - 5x + 6 = 0 \rightarrow (x-2)(x-3) = 0$

$$\begin{cases} x=2 \\ x=3 \end{cases}$$

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$$\begin{cases} x=2 \\ x=3 \end{cases}$$

الف) $x^2 - 3x - 5 = 0 \rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow x = \frac{-(-3) \pm \sqrt{9 - 4 \cdot 1 \cdot (-5)}}{2} = \frac{3 \pm \sqrt{29}}{2}$

$$x = \frac{3 + \sqrt{29}}{2} \quad x = \frac{3 - \sqrt{29}}{2}$$

ب) $2x^2 - 4x + 1 = 0 \rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow x = \frac{-(-4) \pm \sqrt{16 - 4 \cdot 2 \cdot 1}}{4} = \frac{4 \pm \sqrt{8}}{4}$

$$\rightarrow \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2} \quad x = \frac{2 + \sqrt{2}}{2} \quad x = \frac{2 - \sqrt{2}}{2}$$

الف) $x^2 - 3x + 2 = 0 \rightarrow (x-1)(x-2) = 0$

$$\begin{cases} x=1 \\ x=2 \end{cases}$$

ب) $4x^2 + x - 3 = 0 \rightarrow x^2 + \frac{1}{4}x - \frac{3}{4} = 0 \xrightarrow{\text{جد مشترک}} (x-3)(x+\frac{1}{4}) = 0$

$$\begin{cases} x=3 \\ x=-\frac{1}{4} \end{cases}$$

الف) $5x^2 - 12x + 7 = 0 \rightarrow x^2 - \frac{12}{5}x + \frac{7}{5} = 0 \xrightarrow{\text{جد مشترک}} (x-5)(x-7) = 0$

$$\begin{cases} x=\frac{5}{5}=1 \\ x=\frac{7}{5} \end{cases}$$

ب) $3x^2 - 10x + 7 = 0 \rightarrow x^2 - \frac{10}{3}x + \frac{7}{3} = 0 \xrightarrow{\text{جد مشترک}} (x-3)(x-7) = 0$

$$\begin{cases} x=\frac{3}{3}=1 \\ x=\frac{7}{3} \end{cases}$$

$$\text{الف) } \frac{1}{a}x^2 + \frac{5}{b}x - \frac{1}{c} = 0 \rightarrow \Delta = b^2 - 4ac = 25 - 4(-4)(-1) = 25 - 16 = 9$$

9 > 0 ← دو ریشه حقیقی دارد.

$$\text{ب) } \frac{1}{a}x^2 - \frac{1}{b}x + \frac{1}{c} = 0 \rightarrow \Delta = b^2 - 4ac = 1 - 16 = -15 \rightarrow -15 < 0$$

ریشه حقیقی ندارد.

$$\text{ج) } \frac{1}{a}x^2 - \frac{6}{b}x + \frac{1}{c} = 0 \rightarrow \Delta = b^2 - 4ac = 36 - 12 = 24 > 0$$

یک ریشه مضاعف

$$\text{د) } \frac{1}{a}x^2 - \frac{1}{b}x + \frac{1}{c} = 0 \rightarrow \Delta = b^2 - 4ac = 1 - 4 = -3 < 0$$

ریشه حقیقی ندارد.

$$\Delta = 0 \leftarrow \text{یک ریشه مضاعف}$$

$$\Delta < 0 \leftarrow \text{ریشه حقیقی ندارد.}$$

$$\Delta > 0 \leftarrow \text{دو ریشه حقیقی}$$

$$\Delta = b^2 - 4ac$$

$$\Delta = b^2 - 4ac = 9 - 4a$$

$$9 - 4a > 0 \rightarrow -4a > -9 \rightarrow a < \frac{9}{4}$$

$$\frac{1}{a}x^2 - \frac{3}{b}x + \frac{a}{c} = 0$$

$$\Delta > 0 \leftarrow \text{الف)}$$

$$\{a \in \mathbb{R} \mid a < \frac{9}{4}\}$$

$$9 - 4a = 0 \rightarrow -4a = -9 \rightarrow a = \frac{9}{4}$$

$$\Delta = 0 \leftarrow \text{ب)}$$

$$9 - 4a < 0 \rightarrow -4a < -9 \rightarrow a > \frac{9}{4}$$

$$\Delta < 0 \leftarrow \text{ج)}$$

$$9 - 4a > 0 \rightarrow -4a > -9 \rightarrow a \leq \frac{9}{4} \leftarrow \text{د) حداقل یک ریشه}$$

$$y = \frac{1}{a}x^2 + \frac{4}{b}x + \frac{5}{c}$$

Min

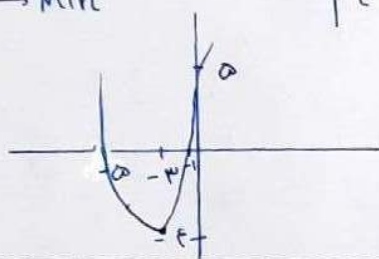
$$\frac{-b}{2a} = \frac{-4}{2} = -2$$

$$\text{ریشه ها} \rightarrow a + c = b \rightarrow x = -1$$

$$x = \frac{-c}{a} = 5$$

$$a > 0 \rightarrow \text{Min}$$

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



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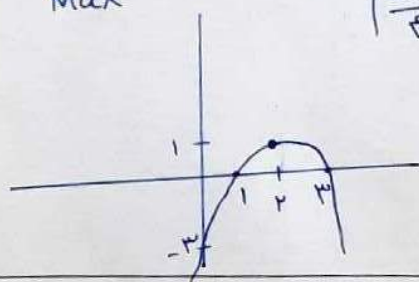
$$y = \frac{1}{a}x^2 + \frac{f}{b}x - \frac{3}{c}$$

$$a < 0 \rightarrow \text{Max}$$

Max

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

$$\frac{-\Delta}{4a} = \frac{-b^2 - 4ac}{4a} = \frac{-f^2}{-4} = 1$$



$$\text{ب) (در ریشه ها)}$$

$$a + b + c = 0 \rightarrow$$

$$x = 1$$

$$x = 3$$

$$\text{در نقاط (1,0), (3,0)}$$

9

$$\frac{1}{a}x^2 - \frac{3}{b}x - \frac{2}{c} = 0$$

$$\text{الف) } S^2 - 2P = 9 + 4 = 13$$

$$S = \frac{-b}{a} = \frac{-(-3)}{1} = 3$$

$$\text{ب) } S^3 - 3SP = 27 + 12 = 39$$

$$P = \frac{c}{a} = \frac{-2}{1} = -2$$

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