

الف) $y = x^2 + 4x + 5 \rightarrow a > 0 \Rightarrow \text{Min}$ ext $\left| \begin{array}{l} -\frac{b}{2a} = \frac{-4}{2 \times 1} = -2 \\ -\frac{\Delta}{4a} = \frac{-(b^2 - 4ac)}{4a} = \frac{-(16 - 20)}{4} = 1 \end{array} \right| = 1$

ب)

الف) $y = -x^2 + 4x - 3 \rightarrow a < 0 \Rightarrow \text{Max}$ ext $\left| \begin{array}{l} -\frac{b}{2a} = \frac{-4}{2 \times (-1)} = 2 \\ -\frac{\Delta}{4a} = \frac{-(b^2 - 4ac)}{4a} = \frac{-(16 - 12)}{-4} = 1 \end{array} \right| = 1$

ب)

پ) وقتی می‌توانیم درجه تقاطع قطع می‌شدیم

باید به دنبال ریشه ببریم که یعنی $y = 0$ است. $y = -x^2 + 4x - 3 \Rightarrow 0 = -(x^2 - 4x + 3) \Rightarrow 0 = (x-1)(x-3) \Rightarrow x = 1$ و $x = 3$

الف) طبق صورت سؤال، باید $\Delta > 0$ باشد. $\Delta > 0 \Rightarrow b^2 - 4ac > 0 \Rightarrow 9 - 4a > 0 \Rightarrow 9 > 4a \Rightarrow \frac{9}{4} > a$

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

ب) $\sim \sim \sim$ باید $\Delta = 0$ باشد.
ج) $\sim \sim \sim$ باید $\Delta < 0$ باشد.

$9 - 4a \geq 0 \Rightarrow a \leq \frac{9}{4}$ باید $\Delta \geq 0$ باشد. $\Delta < 0 \Rightarrow 9 - 4a < 0 \Rightarrow \frac{9}{4} < a$

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

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

الف) $x^2 - 2x - 1 = 0 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a}$, $\Delta = b^2 - 4ac \Rightarrow \Delta = 4 + 4 = 8$
 $x = \frac{2 \pm \sqrt{8}}{2} \Rightarrow \frac{2 \pm 2\sqrt{2}}{2} = \frac{2(1 \pm \sqrt{2})}{2} = 1 \pm \sqrt{2}$
 $\frac{2 - 2\sqrt{2}}{2} = \frac{2(1 - \sqrt{2})}{2} = 1 - \sqrt{2}$

ب) $x^2 + x - 2 = 0 \Rightarrow \Delta = 1 + 8 = 9$, $x = \frac{-1 \pm \sqrt{9}}{2}$

$$\text{الف) } x^2 - 11x + 18 = 0 \rightarrow (x-2)(x-9) = 0 \Rightarrow x \rightarrow \begin{matrix} 2 \\ 9 \end{matrix}$$

$$\text{ب) } x^2 + 13x - 18 \rightarrow (x+18)(x-1) = 0 \Rightarrow x \rightarrow \begin{matrix} -18 \\ 1 \end{matrix}$$

$$\text{الف) } 5x^2 - 12x + 7 = 0 \rightarrow x^2 - 12x + (7 \times 5) = 0 \rightarrow (x-5)(x-14) = 0 \Rightarrow x \rightarrow \begin{matrix} 5 \\ 14 \end{matrix} = 1$$

$$\text{ب) } 10x^2 - 10x + 1 = 0 \rightarrow x^2 - 10x + (1 \times 10) = 0 \rightarrow x^2 - 10x + 10 = 0$$

$$(x-5)(x-1) = 0 \Rightarrow x \rightarrow \begin{matrix} 5 \\ 1 \end{matrix}$$

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

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

$$\text{ج) } 2x^2 - 5x + 1 = 0 \xrightarrow{\Delta = b^2 - 4ac = 25 - 8 = 17}$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow x = \frac{5 \pm \sqrt{17}}{4}$$

$$\text{د) } 4x^2 + 7x + 9 = 0 \xrightarrow{\Delta = b^2 - 4ac = 49 - (16 \times 9) = -125} \Delta < 0 \Rightarrow \text{فاقد ریشه حقیقی است.}$$

$$x^2 - 3x - 4 = 0 \rightarrow \Delta = b^2 - 4ac = (-3)^2 - (4 \times -1 \times 1) = 9 + 4 = 13$$

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

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

$\Delta > 0$ است پس S و P را می توان بدست آورد.

$$\text{الف) } S^2 - 2P = 3^2 - (2 \times -4) = 9 + 8 = 17$$

$$\text{ب) } S^3 - 3SP = 3^3 - (3 \times -4 \times 1) = 27 + 12 = 39$$

$$\text{الف) } \binom{9}{5} + \binom{9}{4} = \frac{9!}{(9-5)! \times 5!} + \frac{9!}{(9-4)! \times 4!} =$$

$$\frac{9!}{4! \times 5!} + \frac{9!}{5! \times 4!} = 126 + 126 = 252$$

$$\binom{n}{k} = \frac{n!}{(n-m)! \times m!}$$

$$\text{ب) } \binom{9}{3} - \binom{8}{2} = \frac{9!}{(9-3)! \times 3!} - \frac{8!}{(8-2)! \times 2!} = \frac{9!}{6! \times 3!} - \frac{8!}{6! \times 2!} =$$

$$148 - 28 = 120$$