

الف) $y = ax^2 + bx + c$ نوع نقطه ext : $a > 0 \Rightarrow Min$

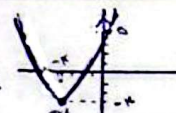
$y = x^2 + 4x + 5$ $\rightarrow$ $a = 1 > 0 \Rightarrow Min$

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

$y = \frac{-\Delta}{4a} = \frac{-14}{4} = -\frac{7}{2}$

$ext = \begin{cases} -\frac{7}{2} \\ -2 \end{cases}$

$\Delta = b^2 - 4ac = 16 - 20 = -4$



ب) $y = ax^2 + bx + c$ نوع نقطه ext : $a < 0 \Rightarrow Max$

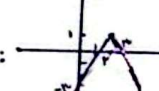
$y = -x^2 + 4x - 3$ $\rightarrow$ $a = -1 < 0 \Rightarrow Max$

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

$y = \frac{-\Delta}{4a} = \frac{-14}{-4} = \frac{7}{2}$

$ext = \begin{cases} \frac{7}{2} \\ 2 \end{cases}$

$\Delta = b^2 - 4ac = 16 - 12 = 4$



ب) $-x^2 + 4x - 3 = 0$ $\rightarrow$ $x = 1$ و $x = 3$

هاتم یه خطی که باید ریشه های x را پیدا کنیم

$2x^2 - 3x + a = 0$

الف) $\Delta = b^2 - 4ac = (-3)^2 - 4(2)(a) = 9 - 8a$

$9 - 8a > 0 \Rightarrow a < \frac{9}{8}$

معادله دو جواب متمایز حقیقی داشته باشد

ب) $\Delta = 9 - 8a \rightarrow 9 - 8a = 0 \Rightarrow a = \frac{9}{8}$

معادله یک ریشه مضاعف داشته باشد

ج) $\Delta = 9 - 8a \rightarrow 9 - 8a < 0 \rightarrow a > \frac{9}{8}$

معادله فاقد ریشه حقیقی باشد

د) $\Delta = 9 - 8a \rightarrow 9 - 8a \geq 0 \Rightarrow a \leq \frac{9}{8}$

معادله ریشه داشته باشد

حل معادله ها به روش مربع کامل:

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

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

$x = \frac{1 \pm \sqrt{5}}{2}$

حل معادله به روش دلتا:

الف) $x^2 - 2x - 1 = 0 \rightarrow \Delta = b^2 - 4ac = (-2)^2 - 4(-1) = 8$

$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{2 \pm \sqrt{8}}{2} = 1 \pm \sqrt{2}$

ب) $x^2 + x - 1 = 0 \rightarrow \Delta = b^2 - 4ac = 1 - 4(-1) = 5$

$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm \sqrt{5}}{2}$

حل معادله به روش جدل مشترک :

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

۶

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

حل معادله به روش رومی :

الف) $x^2 - 12x + 25 = 0 \xrightarrow{-x+5} x^2 - 12x + 25 = 0 \rightarrow (x-5)(x-7) = 0 \Rightarrow \begin{cases} x = \frac{5}{5} = 1 \\ x = \frac{7}{5} = 1.4 \end{cases}$

۷

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

۸

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

۹

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

۱

ج) $2x^2 - 5x + 1 = 0 \rightarrow \Delta = b^2 - 4ac = (-5)^2 - 4(2)(1) = 25 - 8 = 17$
 $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{5 \pm \sqrt{17}}{4}$

د) $4x^2 + 7x + 9 = 0 \rightarrow \Delta = b^2 - 4ac = 7^2 - 4(4)(9) = 49 - 144 = -95$
 $\Delta < 0 \rightarrow$ ریشه حقیقی ندارد

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

الف) $S^2 - 2P = (3)^2 - 2(-2) = 9 + 4 = 13$

۱۰

ب) $S^2 - 3SP = (3)^2 - 3(3)(-2) = 9 + 18 = 27$

۱۱

$\Delta = b^2 - 4ac = (-3)^2 - 4(-2)(1) = 9 + 8 = 17$
 $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{3 \pm \sqrt{17}}{2}$
 $S = \frac{3+\sqrt{17}}{2} + \frac{3-\sqrt{17}}{2} = 3$
 $P = \frac{3+\sqrt{17}}{2} \times \frac{3-\sqrt{17}}{2} = \frac{9-17}{4} = -2$

$\star (a) = \frac{b!}{a!(b-a)!}$

الف) $\binom{5}{2} + \binom{9}{1} = 10 + 9 = 19$

$\binom{b}{a} = \frac{b(b-1)(b-2)\dots(b-a+1)}{a!}$

$\binom{5}{1} = \frac{5 \times 4 \times 3 \times 2 \times 1}{1} = 120$, $\binom{9}{2} = \frac{9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 362880$

ب) $\binom{9}{1} - \binom{4}{1} = 9 - 4 = 5$

$\binom{9}{2} = \frac{9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 362880$, $\binom{4}{1} = \frac{4 \times 3 \times 2 \times 1}{1} = 24$