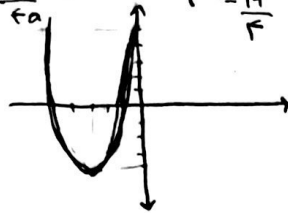


الف) $\min \quad \max \left\{ \begin{array}{l} -\frac{b}{2a} \\ -\frac{\Delta}{4a} \end{array} \right\} = \left\{ \begin{array}{l} -\frac{4}{2} \\ -\frac{14}{4} \end{array} \right\} = \left\{ \begin{array}{l} -2 \\ -\frac{7}{2} \end{array} \right\}$

$\Delta = b^2 - 4ac = 14 - 20 = -6$

عرفان زیبا: $0 + 0 + 5 = 5$

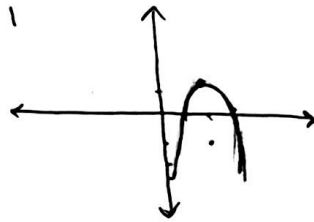
طوبه زیبا: $(x+5)(x-1) \rightarrow x = -1$
 $x = -5$



ب)

الف) $\max \quad \min \left\{ \begin{array}{l} -\frac{b}{2a} \cdot -\frac{b}{2a} \rightarrow 2 \\ -\frac{\Delta}{4a} \cdot -\frac{\Delta}{4a} = 1 \end{array} \right\}$

$\Delta = b^2 - 4ac = 14 - 4(-1)(-2) = 2$



عرفان زیبا: -3

طوبه زیبا: $-(x^2 - 4x + 3) = -(x-1)(x-3)$
 $x = 1 \quad x = 3$

ب) 1, $\frac{2}{a} = \frac{-2}{-1} = 2$

$\Delta > 0 \rightarrow b^2 - 4ac \rightarrow 9 - 4(2)(a) \rightarrow 9 - 8a > 0 \rightarrow -8a > -9 \rightarrow a < \frac{9}{8} \quad \frac{9}{8} < a < 1.125$ (الف)

$\Delta = 0 \rightarrow 9 - 8a = 0 \rightarrow 9 = 8a \rightarrow \frac{9}{8} = a \quad a = 1.125$ (ب)

$\Delta < 0 \rightarrow 9 - 8a < 0 \rightarrow 9 < 8a \rightarrow \frac{9}{8} < a \rightarrow 1.125 < a$ (ج)

د) $a < \frac{9}{8} \cup a = \frac{9}{8} \rightarrow a \leq \frac{9}{8}$ (د)

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

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

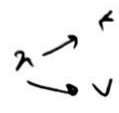
$\Delta = b^2 - 4ac$
الف) $x^2 - 2x - 1 = 0$
 $\Delta = 4 - 4(-1)(1) = 8$
 $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$
 $x = \frac{1+\sqrt{2}}{2} \quad x = \frac{1-\sqrt{2}}{2}$

ب) $x^2 + x - 4 = 0$
 $\Delta = 1 - 4(-1)(-4) = 1 - 16 = -15$

$x = \frac{-1 \pm \sqrt{-15}}{2} = \frac{-1 \pm i\sqrt{15}}{2}$
 $x = \frac{-1 - i\sqrt{15}}{2}$

الف) $x^2 - 11x + 28$

$(x-7)(x-4)$



ب) $x^2 + 2x - 28$

$(x+7)(x-4)$



الف) $5x^2 - 12x + 7 = 0 \rightarrow x^2 - 12x + 35 = 0$
 $(x-7)(x-5)$

$x = \frac{7}{5} \quad x = \frac{5}{1} = 1$

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

$x = \frac{7}{3}$
 $x = \frac{-3}{1}$

الف) $2x^2 - 5x + 2 = 0 \quad a+b+c=0 \quad x=1 \quad x = \frac{c}{a} = \frac{2}{2} = 1$

ب) $2x^2 + 5x + 2 = 0 \quad a+c=b \quad x=-1 \quad x = -\frac{c}{a} = -\frac{2}{2} = -1$

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

د) $4x^2 + 7x + 9 = 0 \quad \Delta = b^2 - 4ac = 49 - 4(4)(9) = -160$
 $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-7 \pm \sqrt{-160}}{8}$

$s = -\frac{b}{a} \quad p = \frac{c}{a}$
 $-\frac{7}{-4} = \frac{7}{4} \quad p = \frac{9}{4} = 2.25$

الف) $s^2 - 2p \rightarrow 9 - 2(2.25) = 4.5$

ب) $s^2 - 2ps \rightarrow 9 - 2(2.25)(\frac{7}{4}) = 9 - 7.875 = 1.125$

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

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

$\frac{9!}{2! \times 7!} = \frac{9 \times 8}{2} = \frac{72}{2} = 36$

ب) $\binom{9}{3} - \binom{1}{2} = \frac{9!}{3!(9-3)!} - \frac{1!}{2!(1-2)!} = \frac{9 \times 8 \times 7}{6} - 1 = 84 - 1 = 83$

$\frac{1!}{4! \times 4!} = \frac{1 \times 1}{24 \times 24} = \frac{1}{576}$