

الف) $x^2 - 4x + 4 = 0 \xrightarrow{+1} x^2 - 4x + 5 = 1 \Rightarrow (x-2)^2 = 1 \Rightarrow x-2 = \pm 1 \Rightarrow \begin{cases} x = 3 \\ x = 1 \end{cases}$

ب) $x^2 + 4x + 4 = 0 \xrightarrow{+9} x^2 + 4x + 13 = 9 \Rightarrow (x+2)^2 = 5 \Rightarrow x+2 = \pm \sqrt{5} \Rightarrow \begin{cases} x = -2 + \sqrt{5} \\ x = -2 - \sqrt{5} \end{cases}$

الف) $x^2 - 4x + 4 = 0 \quad (x-2)(x-2) = 0 \Rightarrow x = 2, x = 2$

ب) $x^2 - 4x - 12 = 0 \quad (x-6)(x+2) = 0 \Rightarrow x = 6, x = -2$

الف) $2x^2 - 3x - 2 = 0 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow x = \frac{3 \pm \sqrt{9 + 16}}{4} = \frac{3 \pm \sqrt{25}}{4}$

ب) $2x^2 - 3x + \frac{1}{2} = 0 \quad x = \frac{3 \pm \sqrt{9 - 2}}{4} \Rightarrow x = \frac{3 \pm \sqrt{7}}{4} = \frac{3 \pm \sqrt{7}}{4} = 1 \pm \frac{\sqrt{7}}{4}$

الف) $x^2 - 3x + 2 = 0 \quad (x-1)(x-2) = 0 \Rightarrow x = 1, x = 2$

ب) $a + b + c = 0 \Rightarrow x = \frac{b}{a} = 2$

ب) $x^2 + x - 12 = 0 \Rightarrow x^2 + x - 12 = 0 \quad (x+4)(x-3) = 0 \Rightarrow \begin{cases} x = -4 \\ x = 3 \end{cases}$

الف) $2x^2 - 12x + 18 = 0 \Rightarrow x^2 - 6x + 9 = 0 \Rightarrow (x-3)(x-3) = 0 \Rightarrow \begin{cases} x = 3 \\ x = 3 \end{cases}$

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

الف) $2x^2 + dx - 1 = 0$ $\Delta = b^2 - 4ac$ $\Delta = 2d - 4 \times 2 \times (-1) = 2d + 8$ $\Delta > 0 \Rightarrow d > -4$ (دو جواب حقیقی متباين)

ب) $2x^2 - x + 2 = 0$ $\Delta = 1 - 4 \times 2 \times 2 = 1 - 16 = -15$ $\Delta < 0$ (هیچ جواب حقیقی ندارد)

ج) $2x^2 - 2x + 2 = 0$ $\Delta = 4 - 16 = -12$ $\Delta < 0$ (هیچ جواب حقیقی ندارد)

د) $2x^2 - x + 1 = 0$ $\Delta = 1 - 4 \times 2 \times 1 = 1 - 8 = -7$ $\Delta < 0$ (هیچ جواب حقیقی ندارد)

الف) $2x^2 - 3x + a = 0$ $\Delta = b^2 - 4ac$ $\Delta = 9 - 8a$ $\Delta > 0 \Rightarrow 9 - 8a > 0 \Rightarrow 9 > 8a \Rightarrow a < \frac{9}{8}$

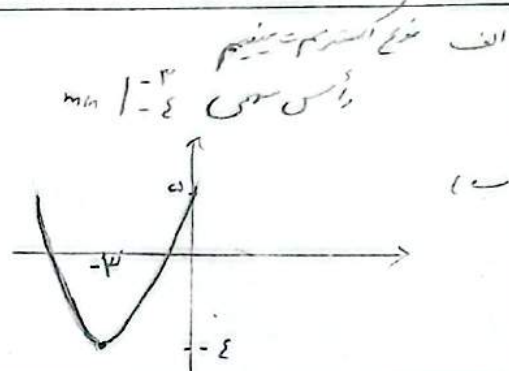
ب) $9 - 8a = 0 \Rightarrow 8a = 9 \Rightarrow a = \frac{9}{8}$ (یک جواب حقیقی دارد)

ج) $9 - 8a < 0 \Rightarrow 9 < 8a \Rightarrow a > \frac{9}{8}$ (هیچ جواب حقیقی ندارد)

د) $9 - 8a \geq 0 \Rightarrow 9 \geq 8a \Rightarrow a \leq \frac{9}{8}$ (دو جواب حقیقی دارد)

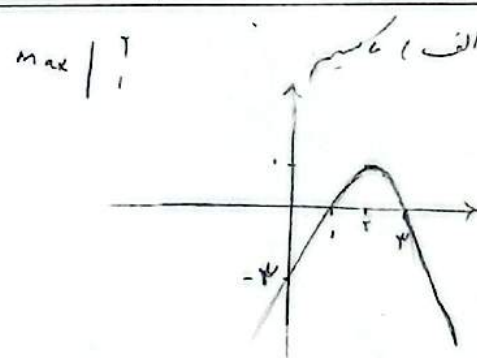
$y = 2x^2 + 4x + d$ $x_{min} = \frac{-b}{2a} \Rightarrow x = \frac{-4}{2 \times 2} = -1$

$y_{min} = 2(-1)^2 + 4(-1) + d = 2 - 4 + d = d - 2$



$y = -2x^2 + 4x - 3$ $x_{max} = \frac{-b}{2a} = \frac{-4}{2 \times (-2)} = 1$

$y_{max} = -2(1)^2 + 4(1) - 3 = -2 + 4 - 3 = -1$



$-2x^2 + 4x - 3 = 0$ $x^2 - 2x + \frac{3}{2} = 0$

$(x-1)(x-2) = 0 \Rightarrow x=1 \text{ یا } x=2$

$2x^2 - 3x - 2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow x = \frac{3 \pm \sqrt{9 + 16}}{4} = \frac{3 \pm 5}{4}$

$x_1 = 2, x_2 = -\frac{1}{2}$

$S = \frac{b}{a} = \frac{-3}{2} = -\frac{3}{2}$

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

الف) $S^2 - 2P = 9 + 4 = 13$ ب) $S^2 - 3S + P = 9 + 11 = 20$