

ا) $x^2 - 4x = -1 \Rightarrow \frac{4}{2} = 2$
 $x^2 - 4x + 4 = -1 + 4$
 $(x - 2)^2 = 1$
 $x - 2 = \pm 1$
 $x_1 = 3$
 $x_2 = 1$

ب) $x^2 + 11x - 12 = 7 \frac{1}{2} = \frac{15}{2}$
 $x^2 + 11x + 12 = 15 + 12$
 $(x + 3)^2 = 9$
 $x + 3 = \pm 3$
 $\left. \begin{array}{l} x + 3 = 3 \\ x + 3 = -3 \end{array} \right\} \begin{array}{l} x = 0 \\ x = -6 \end{array}$

ا) $x^2 - 4x + 4 = 0$
 $(x - 2)(x - 2) = 0$
 $x = 2$

ب) $x^2 - 5x - 12 = 0$
 $(x - 7)(x + 2) = 0$
 $x = 7$
 $x = -2$

ا) $x^2 - 3x - 4 = 0$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow \frac{3 \pm \sqrt{9 + 16}}{2} = \frac{3 \pm 5}{2}$
 $x = \frac{3 \pm 5}{2}$
 $\left\{ \begin{array}{l} x_1 = \frac{3 + 5}{2} = 4 \\ x_2 = \frac{3 - 5}{2} = -1 \end{array} \right.$

ب) $2x^2 - 5x + \frac{1}{2} = 0$
 $b^2 - 4ac = (-5)^2 - 4 \times 2 \times \frac{1}{2} = 17$
 $x = \frac{5 \pm \sqrt{17}}{4} = \frac{5 \pm \sqrt{17}}{4} = 1 \pm \frac{\sqrt{17}}{4}$
 $\left\{ \begin{array}{l} x_1 = 1 + \frac{\sqrt{17}}{4} \\ x_2 = 1 - \frac{\sqrt{17}}{4} \end{array} \right.$

ا) $x^2 - 3x + 2 = 0$
 $(x - 1)(x - 2) = 0$
 $x = 1$
 $x = 2$

ب) $5x^2 + x - 2 = 0$
 $5x^2 + 5x - 4x - 2 = 0$
 $5x(x + 1) - 2(x + 1) = 0$
 $(5x - 2)(x + 1) = 0$
 $\left\{ \begin{array}{l} 5x - 2 = 0 \\ 5x = 2 \\ x = \frac{2}{5} \end{array} \right.$

$x = \frac{2}{5}$
 $x = -1$

ا) $ax^2 - 12x + 4 = 0$
 $x^2 - 12x + 4 = 0$
 $(x - 6)(x - 2) = 0$
 $x_1 = \frac{12}{2} = 6$
 $x_2 = \frac{4}{2} = 2$

ب) $3x^2 - 10x + 4 = 0$
 $x^2 - 10x + 4 = 0$
 $(x - 2)(x - 2) = 0$
 $x_1 = \frac{10}{2} = 5$
 $x_2 = \frac{4}{2} = 2$

$$\begin{aligned} \text{و) } -2x^2 + 5x - 1 &= 0 \\ \Delta = 5^2 - 4 \times 2 \times 1 &= 25 - 8 = 17 \\ 17 > 0 &\Rightarrow \text{اثنين} \end{aligned}$$

$$\begin{aligned} \text{ب) } 2x^2 - x + 2 &= 0 \\ \Delta = (-1)^2 - 4 \times 2 \times 2 &= 1 - 16 = -15 \\ -15 < 0 &\Rightarrow \text{لا شيء} \end{aligned}$$

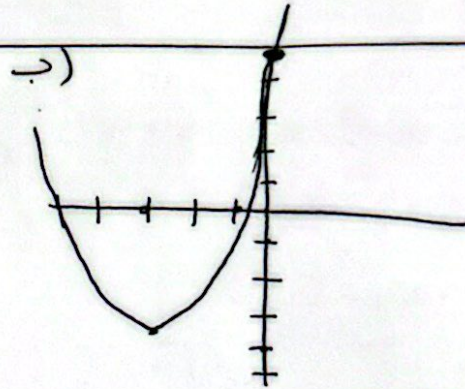
$$\begin{aligned} \text{ج) } 2x^2 - 5x + 2 &= 0 \\ \Delta = (-5)^2 - 4 \times 2 \times 2 &= 25 - 16 = 9 \\ 9 > 0 &= \text{اثنين} \\ \text{د) } 2x^2 - x + 1 &= 0 \\ \Delta = (-1)^2 - 4 \times 2 \times 1 &= 1 - 8 = -7 \\ -7 < 0 &\Rightarrow \text{لا شيء} \end{aligned}$$

$$\begin{aligned} 2x^2 - 2x + a &= 0 \\ \Delta = (-2)^2 - 4 \times 2 \times a \\ \Delta &= 4 - 8a \end{aligned}$$

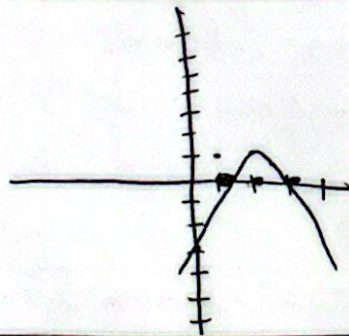
$$\begin{aligned} \text{ا) } \Delta > 0 &\Rightarrow 4 - 8a > 0 \Rightarrow a < \frac{1}{2} \\ \text{ب) } \Delta = 0 &\Rightarrow 4 - 8a = 0 \Rightarrow -8a = -4 \Rightarrow a = \frac{1}{2} \\ \text{ج) } \Delta < 0 &\Rightarrow 4 - 8a < 0 \Rightarrow a > \frac{1}{2} \\ \text{د) } \Delta \geq 0 &\Rightarrow 4 - 8a \geq 0 \Rightarrow a \leq \frac{1}{2} \end{aligned}$$

$$\begin{aligned} y &= x^2 + 4x + a \\ \min &\left| \begin{array}{l} -\frac{b}{2a} = -\frac{4}{2} = -2 \\ -f \end{array} \right. \end{aligned}$$

$$\min \left| \begin{array}{l} -2 \\ -f \end{array} \right.$$



$$\begin{aligned} y &= -x^2 + 4x + a \\ \max &\left| \begin{array}{l} -\frac{b}{2a} = -\frac{4}{-2} = 2 \\ 1 \end{array} \right. \end{aligned}$$



$$\text{ب) } \left| \begin{array}{l} 1 \\ 0 \end{array} \right|, \left| \begin{array}{l} 2 \\ 0 \end{array} \right|$$

$$\begin{aligned} -x^2 + 4x - 2 &= 0 \\ (x-1)(x-2) &= 0 \\ x &= 1, 2 \end{aligned}$$

$$x^2 - 2x - 2$$

$$S = -\frac{b}{a}, P = \frac{c}{a} \quad \left\{ \begin{array}{l} S = -\frac{-2}{1} = +2 \\ P = \frac{-2}{1} = -2 \end{array} \right.$$

$$\text{ب) } S^2 - 4P = 4 - (-8) = 12$$

$$\text{ج) } S^2 - 4SP = 4 - 4 \times 2 \times (-2) = 4 + 16 = 20$$