

$$y = x^2 + 4x + 5$$

$$\min = -\frac{b}{2a} = -\frac{4}{2} = -1$$

$$(-1)^2 + 4(-1) + 5 = 1 - 4 + 5 = 2$$

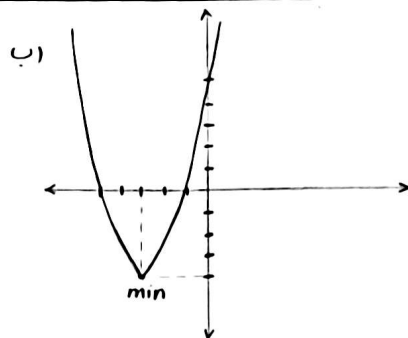
$$\min = 2$$

$$x^2 + 4x + 5 = 0$$

$$(x+1)(x+5) = 0$$

$$x = -1$$

$$x = -5$$



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$$y = -x^2 + 4x - 1$$

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

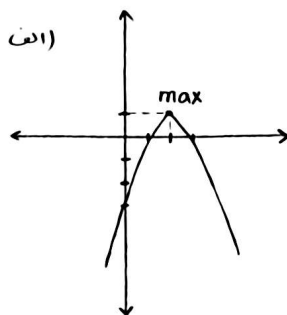
$$-(2)^2 + 4(2) - 1 = -4 + 8 - 1 = 3$$

$$\max = 3$$

$$-x^2 + 4x - 1 = 0$$

$$\Delta = b^2 - 4ac = 4^2 - 4(-1)(-1) = 16 - 4 = 12$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-4 \pm \sqrt{12}}{-2} = \frac{-4 \pm 2\sqrt{3}}{-2} \rightarrow \begin{cases} x = 1 \\ x = 3 \end{cases}$$



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

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

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

$$b) \Delta = 0 \rightarrow b^2 - 4ac = 0$$

$$9 - 8a = 0 \rightarrow 8a = 9 \rightarrow a = \frac{9}{8}$$

$$c) 9 - 8a < 0 \rightarrow 9 < 8a \rightarrow \frac{9}{8} < a \rightarrow a > \frac{9}{8}$$

$$d) 9 - 8a \geq 0 \rightarrow 9 \geq 8a \rightarrow \frac{9}{8} \geq a \rightarrow a \leq \frac{9}{8}$$

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$$a) x^2 - 2x - 1 = 0$$

$$x^2 - 2x - 1 + 2 = 2$$

$$x^2 - 2x + 1 = 2 \rightarrow (x-1)^2 = 2$$

$$x-1 = \pm\sqrt{2} \rightarrow x = 1 \pm \sqrt{2}$$

$$b) x^2 - x - 1 = 0$$

$$x^2 - x - 1 + \frac{1}{4} = \frac{5}{4}$$

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

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$$a) x^2 - 2x - 1 = 0$$

$$\Delta = b^2 - 4ac = (-2)^2 - 4(1)(-1) = 4 + 4 = 8$$

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

$$b) x^2 + x - 4 = 0$$

$$\Delta = b^2 - 4ac = 1^2 - 4(1)(-4) = 1 + 16 = 17$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm \sqrt{17}}{2}$$

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الف) $x^2 - 11x + 28 = 0$ $(x-4)(x-7) = 0 \rightarrow \begin{cases} x=4 \\ x=7 \end{cases}$ ب) $x^2 + 3x - 28 = 0$ $(x+7)(x-4) = 0 \rightarrow \begin{cases} x=-7 \\ x=4 \end{cases}$	٢ ٤
الف) $5x^2 - 12x + 7 = 0$ $x^2 - 12x + 35 = 0$ $(x-5)(x-7) = 0 \rightarrow \begin{cases} x=5 \\ x=7 \end{cases}$ ب) $2x^2 - 10x + 7 = 0$ $x^2 - 5x + 3.5 = 0$ $(x-3.5)(x-1) = 0 \rightarrow \begin{cases} x=3.5 \\ x=1 \end{cases}$	٣ ٧
الف) $2x^2 - 5x + 3 = 0$ $a+b+c = 2-5+3 = 0 \rightarrow \begin{cases} x=1 \\ x=\frac{2}{3} = \frac{c}{a} \end{cases}$ ب) $2x^2 + 5x + 3 = 0$ $a+c = b \rightarrow 2+3=5 \rightarrow \begin{cases} x=-1 \\ x=-\frac{3}{2} = -\frac{c}{a} \end{cases}$ ج) $2x^2 - 5x + 1 = 0$ $\Delta = b^2 - 4ac = (-5)^2 - 4 \times 2 \times 1 = 25 - 8 = 17$ $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{5 \pm \sqrt{17}}{4}$ د) $x^2 + 7x + 9 = 0$ $\Delta = b^2 - 4ac = 7^2 - 4 \times 1 \times 9 = 49 - 36 = 13$ $\Delta < 0 \rightarrow \text{لا يوجد حلا حقيقي}$	٢ ٨
$x^2 - 2x - 2 = 0$ $S = -\frac{b}{a} = -\frac{(-2)}{1} = 2$ $P = \frac{c}{a} = \frac{-2}{1} = -2$ الف) $S^2 - 2P = 2^2 - 2(-2) = 4 + 4 = 8$ ب) $S^3 - 3SP = 2^3 - 3 \times 2 \times (-2) = 8 + 12 = 20$	٤ ٩
الف) $\binom{5}{5} + \binom{9}{1}$ $\frac{5!}{5! \times 1!} = \frac{5! \times 4 \times 3 \times 2 \times 1}{5! \times 1 \times 2 \times 1} = \frac{4 \times 3 \times 2 \times 1}{2 \times 1} = 2 \times 3 = 6$ $\frac{9!}{1! \times 9!} = \frac{9! \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{9! \times 1 \times 2 \times 1} = \frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 = 40320$ $6 + 40320 = 40326$ ب) $\binom{9}{1} - \binom{1}{1}$ $\frac{9!}{1! \times 9!} = \frac{9! \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{9! \times 1 \times 2 \times 1} = \frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 = 40320$ $40320 - 1 = 40319$	٢ ١٠