

الف)  $x^2 - 6x + 1 = 0 \xrightarrow{+1} x^2 - 6x + 9 = 1 \rightarrow (x-3)^2 = 1 \rightarrow x-3 = \pm 1 \rightarrow \begin{cases} x = 3+1 = 4 \\ x = 3-1 = 2 \end{cases}$

ب)  $x^2 + 14x + 17 = 0 \xrightarrow{+9} x^2 + 14x + 49 = 9 \rightarrow (x+7)^2 = 9 \rightarrow x+7 = \pm 3 \rightarrow \begin{cases} x = -1 \\ x = -10 \end{cases}$

الف)  $x^2 - 5x + 6 = 0 \rightarrow (x-2)(x-3) \rightarrow \underline{2, 3}$

ب)  $x^2 - 5x - 14 = 0 \rightarrow (x+2)(x-7) = 0 \rightarrow \underline{-2, 7}$

الف)  $x^2 - 3x - 4 = 0 \rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow \frac{3 \pm \sqrt{9+16}}{2} = \frac{3 \pm \sqrt{25}}{2} \rightarrow \begin{cases} \frac{3+5}{2} = 4 \\ \frac{3-5}{2} = -1 \end{cases}$

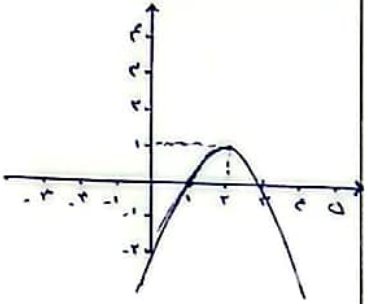
ب)  $2x^2 - 8x + \frac{1}{2} = 0 \rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \rightarrow \frac{8 \pm \sqrt{64-2}}{4} = \frac{8 \pm \sqrt{62}}{4} \rightarrow \frac{2 \pm \sqrt{62}}{2}$

الف)  $x^2 - 3x + 2 = 0 \rightarrow \text{if } a+b+c=0 \rightarrow \frac{c}{a} \rightarrow \underline{1, 2}$

ب)  $5x^2 + x - 3 = 0 \xrightarrow{\text{① Division}} x^2 + x - 12 = 0 \xrightarrow{\Delta} \frac{-1 \pm \sqrt{1+48}}{2} = \frac{-1 \pm \sqrt{49}}{2} \rightarrow \frac{-1 \pm 7}{2} \rightarrow \begin{cases} \frac{-1+7}{2} = 3 \\ \frac{-1-7}{2} = -4 \end{cases}$   
 ②  $\rightarrow \text{if } a+c=b \rightarrow \frac{-c}{a} \rightarrow \underline{-1, \frac{3}{5}}$

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

ب)  $3x^2 - 10x + 7 = 0 \rightarrow x^2 - 10x + 21 = 0 \rightarrow (x-5)(x-7) \rightarrow \underline{5, 7}$

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| $\text{الف) } 3x^2 + dx - 120 \rightarrow \frac{-d \pm \sqrt{d^2 + 144}}{-6} \rightarrow \frac{-d + \sqrt{d^2 + 144}}{-6}, \frac{-d - \sqrt{d^2 + 144}}{-6}$ $\text{ب) } x^2 - x + 120 \rightarrow \frac{1 \pm \sqrt{1 - 144}}{1} \rightarrow \frac{1 + \sqrt{-143}}{1}, \frac{1 - \sqrt{-143}}{1}$ $\text{ج) } x^2 - 5x + 120 \rightarrow \frac{5 \pm \sqrt{25 - 144}}{1} \rightarrow 1$ $\text{د) } x^2 - x + 120 \rightarrow \frac{1 \pm \sqrt{1 - 144}}{1} \rightarrow \frac{1 - \sqrt{-143}}{1}, \frac{1 + \sqrt{-143}}{1}$                                                                                                                                                      | 6  |
| $\text{الف) } \Delta > 0 \rightarrow 9 - 1a > 0 \rightarrow 9 > 1a \rightarrow a < \frac{9}{1} \Rightarrow a \in (-\infty, \frac{9}{1})$ $\text{ب) } \Delta = 0 \rightarrow 9 - 1a = 0 \rightarrow 1a = 9 \rightarrow a = \frac{9}{1}$ $\text{ج) } \Delta < 0 \rightarrow 9 - 1a < 0 \rightarrow 9 < 1a \rightarrow a > \frac{9}{1} \Rightarrow a \in (\frac{9}{1}, +\infty)$ $\text{د) } \Delta \geq 0 \rightarrow 9 - 1a \geq 0 \rightarrow 9 \geq 1a \rightarrow a \leq \frac{9}{1} \Rightarrow a \in (-\infty, \frac{9}{1}]$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <math>\Delta = b^2 - 4ac</math><br/> <math>\Delta = 9 - 1a</math> </div> | 7  |
| $\text{الف) } \text{extr} \begin{vmatrix} \frac{-b}{2a} \\ \frac{-\Delta}{4a} \end{vmatrix} \rightarrow \begin{vmatrix} \frac{-4}{-4} = 1 \\ \frac{-(4^2 - 12)}{4} = \frac{-16 + 12}{4} = \frac{-4}{4} = -1 \end{vmatrix}$  $\text{ب) } y = x^2 + 4x + d \begin{cases} -1 \\ -d \end{cases}$                                                                                                                                                                                                                                                                                                       | 8  |
| $\text{الف) } \text{extr} \begin{vmatrix} \frac{-f}{-2} = 1 \\ \frac{-(16 - 12)}{-4} = \frac{-4}{-4} = 1 \end{vmatrix}$ $\text{ب) } y = -x^2 + 5x - 3 \begin{cases} 1 \\ 3 \end{cases} \rightarrow \begin{vmatrix} 1 \\ 3 \end{vmatrix}$                                                                                                                                                                                                                                                                                                                                                         | 9  |
| $x^2 - 3x + 2 = 0 \rightarrow x = \frac{3 \pm \sqrt{9 - 4}}{2} \rightarrow \frac{3 \pm \sqrt{5}}{2} \rightarrow \frac{3 + \sqrt{5}}{2}, \frac{3 - \sqrt{5}}{2}$ $s = \frac{3 + \sqrt{5}}{2} \text{ و } \frac{3 - \sqrt{5}}{2} = \frac{4}{2} = 2$ $P = \frac{(3 + \sqrt{5})(3 - \sqrt{5})}{4} \rightarrow \frac{9 - 5}{4} = \frac{4}{4} = 1$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <math>\text{الف) } 9 + 12 = 21</math><br/> <math>\text{ب) } 12 + 12 = 24</math> </div>                                                                                                                                                                        | 10 |