

$$\begin{aligned}
 x^2 - 9x + 8 = 0 &\rightarrow \frac{c}{a} = -8 \rightarrow (-8)^2 = 64 \rightarrow x^2 - 9x + 9 - 9 + 8 = 0 \\
 (x-3)^2 - 9 + 8 = 0 &\rightarrow (x-3)^2 - 1 = 0 \rightarrow (x-3)^2 = 1 \rightarrow x-3 = \pm 1 \\
 &\rightarrow \boxed{x = 4} \\
 &\rightarrow \boxed{x = 2} \\
 x^2 + 8x + 7 = 0 &\rightarrow \frac{c}{a} = 7 \rightarrow (7)^2 = 49 \rightarrow x^2 + 8x + 16 - 16 + 7 = 0 \\
 (x+4)^2 - 16 + 7 = 0 &\rightarrow (x+4)^2 - 9 = 0 \rightarrow (x+4)^2 = 9 \rightarrow x+4 = \pm 3 \\
 &\rightarrow \boxed{x = -7} \\
 &\rightarrow \boxed{x = -1}
 \end{aligned}$$

"مربع کامل"

$$\begin{aligned}
 \text{الف)} \quad x^2 - 5x + 4 = 0 &\rightarrow (x-1)(x-4) = 0 \rightarrow (x-1) = 0 \rightarrow \boxed{x = 1} \\
 &\rightarrow (x-4) = 0 \rightarrow \boxed{x = 4} \\
 \text{ب)} \quad x^2 - 5x - 14 = 0 &\rightarrow (x-7)(x+2) = 0 \rightarrow (x-7) = 0 \rightarrow \boxed{x = 7} \\
 &\rightarrow (x+2) = 0 \rightarrow \boxed{x = -2}
 \end{aligned}$$

"حل مستقیم"

$$\begin{aligned}
 \text{الف)} \quad x^2 - 3x - 4 = 0 &\rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{3 \pm \sqrt{(-3)^2 - 4(-4)(1)}}{2(1)} = \frac{3 \pm \sqrt{19}}{2} \\
 &\rightarrow \boxed{\frac{3 + \sqrt{19}}{2}} \\
 &\rightarrow \boxed{\frac{3 - \sqrt{19}}{2}} \\
 \text{ب)} \quad 2x^2 - 5x + \frac{1}{2} = 0 &\rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{5 \pm \sqrt{(-5)^2 - 4(2)(\frac{1}{2})}}{2(2)} = \frac{5 \pm \sqrt{17}}{4} \\
 &\rightarrow \boxed{\frac{5 + \sqrt{17}}{4}} \\
 &\rightarrow \boxed{\frac{5 - \sqrt{17}}{4}}
 \end{aligned}$$

"دیس"

$$\begin{aligned}
 \text{الف)} \quad x^2 - 3x + 2 = 0 &\rightarrow (x-1)(x-2) = 0 \rightarrow (x-1) = 0 \rightarrow \boxed{x = 1} \\
 &\rightarrow (x-2) = 0 \rightarrow \boxed{x = 2} \\
 \text{ب)} \quad 5x^2 + x - 3 = 0 &\rightarrow x = \frac{-1 \pm \sqrt{(1)^2 - 4(5)(-3)}}{2(5)} = \frac{-1 \pm \sqrt{61}}{10} \rightarrow \frac{-1 + \sqrt{61}}{10} = \frac{9}{10} = \boxed{\frac{9}{10}} \\
 &\rightarrow \frac{-1 - \sqrt{61}}{10} = \frac{-11}{10} = \boxed{-\frac{11}{10}}
 \end{aligned}$$

$$\begin{aligned}
 \text{الف)} \quad 3x^2 - 12x + 8 = 0 &\rightarrow x^2 - 4x + \frac{8}{3} = 0 \rightarrow (x-2)(x-\frac{4}{3}) = 0 \\
 x-2 = 0 &\rightarrow x = 2 \rightarrow \boxed{x = 2} \quad x - \frac{4}{3} = 0 \rightarrow x = \frac{4}{3} \rightarrow \boxed{x = \frac{4}{3}} \\
 \text{ب)} \quad 3x^2 - 10x + 3 = 0 &\rightarrow x^2 - \frac{10}{3}x + 1 = 0 \rightarrow (x-3)(x-\frac{1}{3}) = 0 \\
 x-3 = 0 &\rightarrow x = 3 \rightarrow \boxed{x = 3} \quad x - \frac{1}{3} = 0 \rightarrow x = \frac{1}{3} \rightarrow \boxed{x = \frac{1}{3}}
 \end{aligned}$$

"روش"

الف) $-3x^2 + 5x - 1 = 0 \rightarrow b^2 - 4ac = (5)^2 - 4(-3)(-1) = 25 - 12 = 13$
 $\Delta > 0 \rightarrow$ دو ریشه حقیقی متمایز

ب) $2x^2 - x - 2 = 0 \rightarrow \Delta = (-1)^2 - 4(2)(-2) = 17 \Rightarrow \Delta > 0 \rightarrow$ دو ریشه حقیقی متمایز

ج) $2x^2 - 4x + 2 = 0 \rightarrow \Delta = (-4)^2 - 4(2)(2) = 0 \Rightarrow \Delta = 0 \rightarrow$ یک ریشه حقیقی مضاعف

د) $x^2 - x + 1 = 0 \rightarrow \Delta = (-1)^2 - 4(1)(1) = -3 \Rightarrow \Delta < 0 \rightarrow$ مقدار جوابی ندارد

الف) $2x^2 - 3x + a = 0 \rightarrow \Delta = b^2 - 4ac \rightarrow (-3)^2 - 4(2)(a) = 9 - 8a$

$9 - 8a > 0 \rightarrow -8a > -9 \rightarrow a < \frac{9}{8} \rightarrow$ دو ریشه حقیقی متمایز

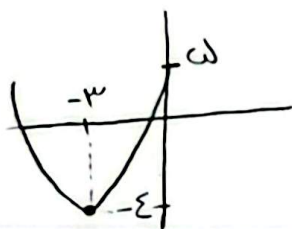
ب) $9 - 8a = 0 \rightarrow -8a = -9 \rightarrow a = \frac{9}{8} \rightarrow$ یک ریشه حقیقی مضاعف

ج) $9 - 8a < 0 \rightarrow -8a < -9 \rightarrow a > \frac{9}{8} \rightarrow$ فاصله ریشه حقیقی

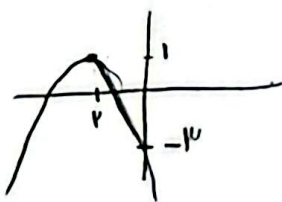
د) $9 - 8a > 0 \rightarrow -8a > -9 \rightarrow a < \frac{9}{8} \rightarrow$ هم مضاعف و دو ریشه حقیقی متمایز دارای ریشه

الف) $y = x^2 + 4x + 5 \rightarrow$ ضریب $x > 0 \rightarrow \min \left| \begin{aligned} \frac{-b}{2a} &= \frac{-4}{2} = -2 \\ (-2)^2 + 4(-2) + 5 &= -1 \end{aligned} \right|$

ب) $x = 0 \rightarrow y = 5$ عرض از مبدأ



الف) $y = -x^2 + 2x - 3 \rightarrow$ ضریب $x < 0 \rightarrow \max \left| \begin{aligned} \frac{-b}{2a} &= \frac{-2}{-2} = 1 \\ (1)^2 + 2(1) - 3 &= 1 \end{aligned} \right|$



ب) $y = 0 \rightarrow -x^2 - 4x - 3 = 0 \xrightarrow{x(-1)} x^2 + 4x + 3 = 0 \xrightarrow{\text{تجزیه}} (x+3)(x+1) = 0$
 $\rightarrow$ نقطه برخورد $\rightarrow \{-3\}, \{-1\}$

الف) $x^2 - 3x - 2 = 0 \rightarrow S = \frac{-b}{a} = \frac{-(-3)}{1} = 3, P = \frac{c}{a} = \frac{-2}{1} = -2$
 $S^2 - 2P = (3)^2 - 2(-2) = 9 + 4 = 13$

ب) $S^3 - 3SP = (3)^3 - 3(3)(-2) = 27 - (-18) = 45$