$-\frac{b}{2a} = 2 \Rightarrow \frac{-1}{m-2} = 2 \Rightarrow 2a - 4 = -1$ $\quad 2a = 3 \Rightarrow a = \frac{3}{2}$ $\quad \Rightarrow y = -\frac{1}{2}x^2 + x + 3 \rightarrow x^2 - 2x - 12 = 0$ ①

$(x-4)(x+2) \rightarrow x = 4, -2$ ی

I

$m < 0$ ← چون علامت بین x_1 و x_2 مثبت است

$\Delta > 0 \rightarrow$ چون این معادله ۲ ریشه‌ی حقیقی دارد $\Rightarrow 25 - (4)(m)(m) > 0$ ②

II

$25 - 4m^2 > 0 \Rightarrow 25 > 4m^2 \Rightarrow \frac{25}{4} > m^2 \Rightarrow -\frac{5}{2} < m < +\frac{5}{2}$ ی

$I \cap II : -\frac{5}{2} < m < 0$

$\alpha \times \beta = \frac{c}{a} = \frac{3-\sqrt{5}}{3} \times \frac{3+\sqrt{5}}{3} = \frac{9-5}{9} = \frac{4}{9}$ ③

$\alpha + \beta = \frac{-b}{a} = \frac{3-\sqrt{5}+3+\sqrt{5}}{3} = \frac{6}{3} = 2$ ی

$\Rightarrow y = x^2 - 5x + P \; ; \; x^2 - 2x + \frac{4}{9} = 9x^2 - 18x + 4 = 0$

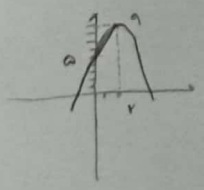
$2x^2 - 12x + m + 2 = 0$ ④

$\alpha + \beta = \frac{-b}{a} = \frac{+18}{2} = 9 \Rightarrow \alpha + \beta = 9 \Rightarrow \alpha = 9 - \beta$ ی

$\Rightarrow 3(9-\beta)^2 + \beta^2 = 12 \Rightarrow 243 + 3\beta^2 - 54\beta + \beta^2 = 12$

$\Rightarrow 4\beta^2 - 54\beta + 243 = 0 \Rightarrow \beta^2 - 6\beta + 9 = 0 \Rightarrow \beta = 3, \; \alpha = 6$

$\frac{\alpha \times \beta}{3} = \frac{c}{a} \Rightarrow \frac{m+2}{2} = 3 \Rightarrow m + 2 = 6 \Rightarrow m = 4$



⑤

$y = a(x - x_0)^2 + y_0 \Rightarrow 0 = a(0-2)^2 + 9 \Rightarrow 4a = -9$

$a = -1$

$y = -(x-2)^2 + 9 \Rightarrow y = -x^2 + 4x + 5 \Rightarrow x^2 - 4x - 5 = 0$ ی

$(x-5)(x+1) \rightarrow x = 5, -1$

$x^2 - 4x$ ← محور تقارن $\rightarrow (-1, 5) \rightarrow a > 0$

⑥

$\alpha \times \beta = \frac{9\beta}{\alpha} \Rightarrow \alpha^2 = 9 \Rightarrow \alpha = \pm 3$

$\alpha + \beta = \frac{7}{\alpha} \Rightarrow \alpha = 3 \Rightarrow 3 + \beta = \frac{7}{3} \Rightarrow \beta = -\frac{2}{3}$ ق ق ق $\quad \beta > 0$ چون

$\alpha = -3 \Rightarrow -3 + \beta = -\frac{7}{3} \Rightarrow \beta = \frac{2}{3}$ ق

$\frac{1}{\alpha} + \frac{1}{\beta} = -\frac{1}{3} + \frac{3}{2} = \frac{7}{6}$ ی

$m = 2 \rightarrow \Delta > 0$ ✓ $\rightarrow S = -m = -2$

$m = -6 \rightarrow \Delta < 0$ ✗

⑦

$2x^2 + 3mx - 2m = 0$

$\alpha \times \beta = \frac{c}{a} = \frac{-2m}{1} \Rightarrow \alpha \times \beta = -2m$

$\alpha + \beta = \frac{-b}{a} \Rightarrow \alpha + \beta = -m \rightarrow \boxed{\alpha + \beta = 6, -2}$ ی

$m^2 + 2m - 8 = 0 \rightarrow m = -6, 2$

$\alpha^2 - m\beta = 8 \Rightarrow \alpha^2 + (\alpha + \beta)\beta = 8 \Rightarrow \alpha^2 + \alpha\beta + \beta^2 = 8$

$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$

$\Rightarrow m^2 + 6m - 2m = m^2 + 12m \Rightarrow m^2 + 12m = 8$ ↑

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$\frac{-\Delta}{4a} = 1 \Rightarrow \frac{2m^2+12m-14}{4m} = 1 \Rightarrow 2m^2+12m-14 = 4m \Rightarrow 2m^2-4m-14=0$

$m^2-2m-7=0 \rightarrow m = \frac{4}{2}, \frac{-3}{2} = 2, -1$ (1)

$\Delta = b^2-4ac = 14-4(m)(\frac{m}{2}+1) \Rightarrow 14-2m^2-4m$

$m=-2 \rightarrow -2x^2+4x+7 \rightarrow x^2+4x-12=0 \rightarrow x = \frac{-6}{-2}, \frac{2}{2} \Rightarrow K=3$

$m=4 \rightarrow 4x^2+4x+9$ غ ق ق ← چون در این معادله $a>0$ ← درحالی که در شکل $a<0$

$y = a(x-x_0)^2+y_0 \Rightarrow 4 = a(0-2)^2+7 \Rightarrow 4a = -3$ (9)

$a = -\frac{1}{4}$

$y = -\frac{1}{4}(x-2)^2+7 \Rightarrow -\frac{1}{4}x^2+2x-1+7 \xrightarrow{\times -4} x^2-8x-24=0 \rightarrow \Delta = 16+96 = 112 \rightarrow x = \frac{8 \pm \sqrt{112}}{2} = 4 \pm 4\sqrt{7}$

$x^2-8x+12$

$\frac{1}{2-4\sqrt{7}} + \frac{1}{2+4\sqrt{7}} = \frac{2-4\sqrt{7}+2+4\sqrt{7}}{-24} = -\frac{4}{24} = -\frac{1}{6}$

$x_1 x_2 = 4a^2+2a+3 \Rightarrow 2(4a+2) = 4a^2+6a+3 \Rightarrow 8a+4 = 4a^2+2a+3 \Rightarrow 4a^2-6a-1=0$ (10)

$x_1+x_2 = 4a+4 \Rightarrow a = 4a+2$

$a^2-2a-3=0$

$(a-3)(a+1) \rightarrow a = \frac{3}{3}, \frac{-1}{3} = 1, -\frac{1}{3}$

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$a=1 \rightarrow x^2-8x+12=0$

$(x-2)(x-6) \rightarrow x = 2, 6$ ق ق ← ریشه دوبل $= 6$

$a = -\frac{1}{3} \rightarrow x^2+\frac{8}{3}x+\frac{4}{3}=0 \rightarrow 3x^2+8x+4=0 \rightarrow x^2+4x+12=0$

$(x+2)(x+6) \rightarrow x = -\frac{2}{3}, -\frac{6}{3}$ غ ق ق

$x = 2, \frac{2}{3}$

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