۲۰ آفرین!

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۱ (۲)

$y = (a-1)x^2 + x + 3$

$x_s = x_{\text{نقطه عطف}} = \frac{-b}{2a} = \frac{-1}{2a-2} = 2 \Rightarrow -1 = 4a - 4 \Rightarrow 4a = 3 \Rightarrow a = \frac{3}{4}$

$y = \frac{-1}{4}x^2 + x + 3 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a}$, $\Delta = 1 - 4(-\frac{1}{4})(3) = 4$, $x = \frac{-1 \pm 2}{-\frac{1}{2}} = 6, -2$

۲ (۲)

$f(x) = mx^2 - 5x + m$

x_1 x_2 : $- \; + \; -$

1) $\Delta > 0 \Rightarrow 25 - 4m^2 > 0 \Rightarrow 4m^2 - 25 < 0$ (I): $-\frac{5}{2}$, $\frac{5}{2}$: $+ \; - \; +$

2) $m < 0$ (II)

$\Longrightarrow I \cap II =$ $-2/5$, 0, $2/5$

$m \in (-2/5, 0)$

۳ (۲)

$y = x^2 - Sx + P = x^2 - 2x + \frac{4}{9} \xrightarrow{\text{ضرب در ۹}} 9x^2 - 18x + 4$

۴ (۲)

$y = 2x^2 - 8x + m + 2 = 0$ → $S = 4$, $P = \frac{m+2}{2}$

$S^2 - 2P$ $\frac{\sqrt{\Delta}}{|a|}$ $(\beta - \alpha)(\beta + \alpha)$

$3\alpha^2 + \beta^2 = 2\alpha^2 + \alpha^2 + 2\beta^2 - \beta^2 = 2(\alpha^2 + \beta^2) - (\beta^2 - \alpha^2) = 12 \Longrightarrow$

$2(\underbrace{16 - m - 2}_{14-m}) - (4)\left(\frac{\sqrt{48 - 8m}}{2}\right) = 28 - 2m - 2\sqrt{48 - 8m} = 12 \Longrightarrow$

$-2\sqrt{48 - 8m} = 12 - \cancel{28} + 2m$ ($-16 + 2m$) $= (\sqrt{48 - 8m} = 8 - m)^2 = 48 - 8m = 64 + m^2 - 16m = m^2 - 8m + 16 = 0$

$(m - 4)^2 = 0 \Rightarrow m = 4$

۵ (۲)

$-x^2 + 4x + 5 > 0 \xrightarrow{\times -1} x^2 - 4x - 5 < 0$

$(x - 5)(x + 1) < 0$

-1 5 : $+ \; - \; +$

$(-1, 5)$

$y = ax^2 + bx + \cancel{c}\ 5$

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

$x_s = \frac{-b}{2a} = 2 \Rightarrow b = -4a$ جایگذاری

$y_s = 4a + 2b + 5 = 9 \Longrightarrow 4a - 8a = 4 \Rightarrow a = -1$, $b = 4$

$-4a$

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$y=\alpha x^2-7x+9\beta=0$

$\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\beta+\alpha}{\alpha\beta}=\frac{\frac{7}{\alpha}}{\frac{9\beta}{\alpha}}=\frac{7}{9\beta}$ یا $\frac{\frac{7}{\alpha}}{\alpha\beta}=\frac{7}{\alpha^2\beta}\Rightarrow\alpha=\pm3$

$S=\frac{7}{\alpha}$

$P=\frac{9\beta}{\alpha}$

$\alpha\to -3=\beta-3=\frac{-7}{3}\Rightarrow\boxed{\beta=\frac{2}{3}}$ و $\boxed{\alpha=-3}\Rightarrow\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\frac{7}{1}}{\frac{6}{1}}=\frac{7}{6}$

$\alpha\to 3=\beta+3=-\frac{7}{3}\Rightarrow\beta=\frac{-16}{3}\to$ غ ق ق

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

کد $\boxed{\alpha+\beta=-m}$ $\Longrightarrow\alpha^2-m\beta=8\Rightarrow\alpha^2+(\alpha+\beta)\beta=\underbrace{\alpha^2+\alpha\beta+\beta^2}=8$

$\boxed{P=-2m}$ $S^2-P=8\Rightarrow m^2+2m=8$

غ ق ق ← زیرا $\Delta<0$ $\quad m^2+2m-8=0$

$\alpha+\beta=-m=-2$ $\quad m=-4$ یا 2 ✓ $\Leftarrow(m+4)(m+2)=0$

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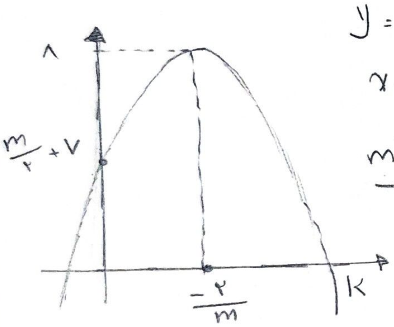

$y=mx^2+4x+\frac{m}{2}+7$

$x_S=\frac{-4}{2m}=\frac{-2}{m}\Rightarrow y_S=\underbrace{m\left(\frac{4}{m^2}\right)+4\left(\frac{-2}{m}\right)+\frac{m}{2}+7}$

$\frac{m^2+14m-8}{2m}=8\Rightarrow m^2+14m-8=16m\Rightarrow m^2-2m-8=0$

$(m-4)(m+2)=0\Rightarrow m\to 4\to$ غ ق ق $\to$ (اینطور y_S منفی میشه)

$\quad\quad\quad\to -2$ ✓

$y=-2x^2+4x+6\Rightarrow x=-1$ یا $3=k$

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$y=ax^2+bx+\cancel{c}\ 4$

$x_S=\frac{-b}{2a}=2\Rightarrow b=-4a$ جایگذاری

$y_S=4a+2b+4=6\Rightarrow 4a-8a=2\Rightarrow a=-\frac{1}{2}$ و $b=2$

$y=\frac{-x^2}{2}+2x+4=0$

$x_1=2+2\sqrt{3}\ ,\ x_2=2-2\sqrt{3}$

$\frac{1}{x_1}+\frac{1}{x_2}=\frac{2-2\sqrt{3}}{-8}+\frac{2+2\sqrt{3}}{-8}=\frac{4}{-8}=-\frac{1}{2}$

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۱۰

$y=x^2-(4a+4)x+(3a^2+6a+3)=0$ $\quad(a-3)(a+1)\Rightarrow a=\cancel{3}$ یا $-\frac{1}{3}$

$4-8a-8+3a^2+6a+3=0\Rightarrow 3a^2-2a-1=0\xrightarrow{ac}a^2-2a-3=0$

$a\xrightarrow{3}x^2-8x+12=0\Rightarrow(x-6)(x-2)\Rightarrow x=2,6$

$a\xrightarrow{-\frac{1}{3}}x^2-\frac{8}{3}x+\frac{4}{3}=0\Rightarrow x=\frac{2}{3},2$

ریشه (۲)) 6 یا $\frac{2}{3}$