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حل المپیاد ریاضی

$\alpha^2+\beta^2 = \frac{-5}{12a} = -\frac{1}{2}$

$\alpha+\beta = \alpha^2+\beta^2+4 = -\frac{1}{2}+4 = \frac{7}{2} \rightarrow \frac{7}{2} = \frac{a}{2} \rightarrow a=7$

$2x^2-7x+b=0 \qquad \frac{b}{2} = P = (\alpha^2+2)(\beta^2+2) = \alpha^2\beta^2 + 2(\alpha^2+\beta^2)+4 = -\frac{7}{14}+4$

$ab = 7(\frac{-7}{2}+9) \qquad b = -\frac{7}{2}+9 \qquad [\frac{ab}{4}] = [\frac{39}{4}] = 9$

$-7+63 = 39$

۱۷) اختلاف ریشه‌ها؟ β, α

$ax^2-ax-b=0 \quad , \quad 40\beta^2+30\alpha^2-20\beta = 17$

$S = 1 \Rightarrow \alpha+\beta = 1 \rightarrow -\alpha = \beta - 1$

$\beta^2+\alpha^2 = S^2-2P = 1+\frac{2b}{a}$

$20\beta^2+20\beta^2+20\alpha^2-20\beta = 17$

$20(\beta^2+\alpha^2)+20\beta(\beta-1) = 20(1+\frac{2b}{a})+20\frac{b}{a} = 20+\frac{60b}{a}$

$20+60\frac{b}{a} = 17 \rightarrow \frac{b}{a} = -\frac{1}{20} \rightarrow b = -\frac{a}{20}$

$\alpha-\beta = \frac{\sqrt{\Delta}}{|a|} = \frac{\sqrt{a^2+4ab}}{|a|} \rightarrow \frac{\sqrt{a^2-\frac{4a^2}{20}}}{|a|} = \sqrt{1-\frac{1}{5}} = \frac{2}{\sqrt{5}}$

۱۸)

$x^2-(a+1)x+a=0 \quad |a-1|$

$\alpha^2-\beta^2 = \frac{\sqrt{\Delta}}{|a|} = \frac{\sqrt{(a+1)^2-4a}}{|a|}$

$x^2-(3a+1)x+b=0$

دو عدد فرد متوالی 4β

$\alpha = 2\alpha+3 \quad , \quad 2\alpha+1 = \beta$

$\alpha^2-\beta^2 = 2\alpha+3-(2\alpha+1) = 2$

دو عدد زوج متوالی $\alpha'\beta'$

$\alpha\beta-\alpha'\beta'$?

$2a, 2a+2 \rightarrow \beta'-\alpha' = 2 \rightarrow \frac{\sqrt{\Delta}}{|a|} = \frac{\sqrt{(3a+1)-4b}}{|a|}$

$\frac{|a-1|}{|a|} = 2 \rightarrow 2|a| = |a-1|$

$\frac{\sqrt{(3a+1)-4b}}{|a|} = 2 \rightarrow \sqrt{-2-4b} = 2 \rightarrow b = -\frac{3}{2}$

$2a = a-1 \rightarrow a = -1$ ق

$2a = 1-a \rightarrow 3a = 1 \rightarrow a = \frac{1}{3}$ غ ق

$\alpha' = -1 \qquad \beta' = 1 \rightarrow \alpha'\beta' = -1$

$P = \frac{b}{1} = -\frac{3}{2} \qquad -1-(-\frac{3}{2}) = \frac{1}{2} = \alpha\beta - \alpha'\beta'$

۱۹)

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

کمترین مقدار $= 3$

$(\alpha+\beta)^2-2\alpha\beta = 1+2(1+m^2) = 3+2m^2$

$y_{min} = 2m^2+3 \rightarrow m=0 \rightarrow 3$

۲۰)

$a:(3, y) \qquad \beta(2a, y)$

روی سهمی $y_0 = 1$

اگر سهمی نقطه α و β محور x ها را قطع

$2\beta^2 = 5 \rightarrow (\alpha+\beta)^2 - 2\alpha\beta = 5 \rightarrow S^2 = 5+2P$

$S = \sqrt{5+2P}$

$x^2+\sqrt{5+2P}x+P$

$S = ?$

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۲a = 1 − a → ۳a = 1 → $a = \frac{1}{۳}$

$\alpha' = -1$ $\beta' = 1$ → $\alpha'\beta' = -1$

۱۸۱

$P = \frac{b}{1} = -\frac{۳}{۲}$ $-1 - (1 - \frac{۳}{۲}) = \frac{1}{۲} = \alpha\beta - \alpha'\beta'$

(۹

هیچ مقداری

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

۲ = α+β گزینه

$(\alpha+\beta)^2 - ۲\alpha\beta = 1 + ۲(1+m^2) = ۳ + ۲m^2$

−1

$y_{Min} = ۲m^2 + ۳$ → m = 0 → ۳

راه ۲: [illegible]

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$x_{رأس} = \frac{-b}{2a} = -1 \qquad y_{رأس} = 1$

$-\frac{b}{2a} = -1 \to b = 2a$

$(-1, 1)$

$ax^2 + 2ax + c = 1 \to a - 2a + c = 1 \to c = a + 1$

$ax^2 + 2ax + a + 1 = y$

$(\alpha + \beta)^2 - 2\alpha\beta = 5 \to 4 - 2\left(\frac{a+1}{a}\right) = 2 - \frac{2}{a} = 5 \to a = -\frac{2}{3}$

$\alpha + \beta = -\frac{2a}{a}$

$c = a + 1 = -\frac{2}{3} + 1 = \frac{1}{3}$