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نام و نام خانوادگی ...آمین ایزدی... پاسخنامه تشریحی تکلیف شماره ..۱۹.. کلاس ...A...

۱ (۲)

$3x^2-ax+4=0 \qquad P=\frac{4}{3}\ ,\ S=\frac{a}{3}$ ، $r , 3r \to$ ریشه‌ها

$r\times 3r=\frac{4}{3} \Rightarrow 9r^2=4 \to r^2=\frac{4}{9} \to r=\pm\frac{2}{3}$ ، $\frac{a}{3}=4r \Rightarrow a=12r$

$\Rightarrow a=8\ ,\ a=-8 \Rightarrow 8-(-8)=16$ ✓

۲ (۲)

$36x^2-(m+14)x+1=0 \qquad \alpha+\beta=\frac{m+14}{36}\ ,\ \alpha\beta=\frac{1}{36} \qquad \sqrt{\frac{1}{\alpha}}+\sqrt{\frac{1}{\beta}}=5$

$(\ )^2 \Rightarrow \frac{1}{\alpha}+\frac{1}{\beta}+2\sqrt{\frac{1}{\alpha\beta}}=25 \Rightarrow \frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}=m+14\ ,\ \sqrt{\frac{1}{\alpha\beta}}=\sqrt{36}=6 \Rightarrow m+14+2(6)=25$

$\Rightarrow m+26=25 \to m=-1 \Rightarrow -x^2+3x+2=0 \Rightarrow \frac{c}{a}=\frac{2}{-1}=-2$ ✓

۳ (۲)

$4x^3+kx^2-9x-2=0 \qquad \alpha+\beta=1\ ,\ \alpha\beta=-2 \Rightarrow x^2-x-2=(x-2)(x+1)=0$

$\Rightarrow \begin{cases} \alpha=2 \to 32+4k-18-2=0 \Rightarrow 4k=-12 \to k=-3 \\ \beta=-1 \to -4+k+9-2=0 \to k=-3 \end{cases}$ ✓

۴ (۱)

$x^2+6x+a=0\ ,\ 3\alpha^2+2\beta^2=12\sqrt{2}+85\ ,\ \alpha<\beta<0\ ,\ \alpha+\beta=-6\ ,\ \alpha\beta=a$

$\to \alpha=\frac{-6-D}{2}\ ,\ \beta=\frac{-6+D}{2} \to D=\beta-\alpha=\sqrt{(\alpha+\beta)^2-4\alpha\beta}=\sqrt{36-4a}$

$\alpha^2=\frac{36+12D+D^2}{4}\ ,\ \beta^2=\frac{36-12D+D^2}{4} \Rightarrow 3\alpha^2+2\beta^2=\frac{1}{4}\left(3(36+12D+D^2)+2(36-12D+D^2)\right)$

$=\frac{1}{4}(180+12D+5D^2)=12\sqrt{2}+85 \to 5D^2+12D-160-48\sqrt{2}=0 \xrightarrow{D=2\sqrt{2}} D^2=36-4a \to 8=36-4a \to 4a=28 \to a=7$

۵ (۱٫۵)

$x^4-7x^2-5=0 \to t^2-7t-5=0 \Rightarrow t_1=\frac{7+\sqrt{69}}{2}\ ,\ t_2=\frac{7-\sqrt{69}}{2}$ <0 غ ق ق

$t=x^2$

$\Rightarrow x=\pm\sqrt{\frac{7+\sqrt{69}}{2}}\ ,\ x=\pm\sqrt{\frac{7-\sqrt{69}}{2}} \Rightarrow S=0\ ,\ P=-5$

$P=-\left(\frac{7+\sqrt{69}}{2}\right)$

$\Rightarrow 2P^2-3SP+2S=50-3(0)(-5)+2(0)=50$

$2P^2-3SP+2S=2P^2=59+7\sqrt{69}$

آرین ایزدی

$2x^2-ax+b=0$, $2ax^2+ax-4=0 \rightarrow S=-\frac{a}{2a}=-\frac{1}{2}$, $(\alpha+0/a)+(\beta+0/a)=\frac{1}{2}$

$\frac{a}{2}=\frac{1}{2} \Rightarrow a=1$, $(\alpha+0/a)(\beta+0/a)=\alpha\beta+0/a(\alpha+\beta)+0/2a$

$\rightarrow -\frac{3}{a}+0/a(-\frac{1}{2})+0/2a \xrightarrow{a=1} -3-\frac{1}{2}+\frac{1}{2}=-3 \Rightarrow \frac{b}{2}=-3 \rightarrow b=-6$

$a=1, b=-6 \Rightarrow \left[\frac{ab}{2}\right]=\left[\frac{-6}{2}\right]=[-1/a]=-2$ ✓

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α, β $ax^2-ax-b=0$, $10\beta^2+10\alpha^2-10\beta^2=17$

$S=\alpha+\beta=1 \Rightarrow \alpha=1-\beta \Rightarrow 10\beta^2+10(1-\beta)^2-10\beta=17 \Rightarrow 10\beta^2-10\beta+10=17$

$\rightarrow 10\beta^2-10\beta+1=0 \Rightarrow \beta=\frac{10\pm\sqrt{100-40}}{20}=\frac{10\pm\sqrt{36\times10}}{20}=\frac{5\pm3\sqrt{10}}{10}$

$\rightarrow \alpha=1-\beta=\frac{1\mp3\sqrt{10}}{10} \Rightarrow |\alpha-\beta|=\frac{6\sqrt{10}}{10}$ ✓

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

$3|k+1, 3|k-1 \Rightarrow a=(3k-1)(3k+1) \rightarrow 3k^2-1=a$, $3a+1=3m+3 \rightarrow 3m+3=3a+1$

$a=3k^2-1 \rightarrow 3m+3=3(3k^2-1)+1=9k^2-2 \rightarrow 3m=9k^2-5 \rightarrow m=3k^2-1$

$b=(3m)(3m+3)=3m(m+1) \rightarrow b=3(3k^2-1)(3k^2)=9k^2(3k^2-1)$

$b-a=9k^2(3k^2-1)-(3k^2-1) \xrightarrow{k=1} a=2, b=18 \rightarrow b-a=16$ ✓

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$x^2+x-1+m^2=0$ $\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta \rightarrow 3+2m^2 \xrightarrow{\text{کمترین مقدار}} \alpha^2+\beta^2=3$

$\delta=-1, P=-(1+m^2)$ $m^2=0$

(۲) ۹

$\omega_1 \rightarrow (-1,1) \Rightarrow y=a(x+1)^2+1 \xrightarrow{y=0} 0=a(x+1)^2+1 \rightarrow (x+1)^2=-\frac{1}{a}$

$\Rightarrow \alpha=\sqrt{-\frac{1}{a}}-1, \beta=-\sqrt{-\frac{1}{a}}-1$ $S=\alpha+\beta=-2, P=\alpha\beta=1+\frac{1}{a}$

$\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta \Rightarrow 2=4-2(1+\frac{1}{a}) \rightarrow a=-\frac{2}{3} \Rightarrow y=-\frac{2}{3}(x+1)^2+1$

$x=0 \rightarrow \left(0, \frac{1}{3}\right)$ ✓

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$S = -4 \quad P = a$

$\alpha, \beta = \frac{-4 \mp \sqrt{36-4a}}{2} \xrightarrow{\alpha<\beta} \alpha = -3 - \sqrt{9-a}$

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

$(-3 - \sqrt{9-a})^2 + 2(36 - 2a) = 12\sqrt{2} + 85 \rightarrow a = 1$