بارش شریفی — تکلیف سری بیست و هشتم — کلاس A

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سوال ۱: α در کدام ناحیه؟

$\cot\alpha = \frac{\cos\alpha}{\sqrt{1-\cos^2\alpha}}$ $\quad \frac{1}{\sqrt{\cos^2\alpha}} - \frac{1}{\cot\alpha} = \frac{1-\sin\alpha}{|\cos\alpha|}$

$\cot\alpha = \frac{\cos\alpha}{|\sin\alpha|} \Rightarrow \sin\alpha$ در ناحیه دوم یا اول

$\frac{1}{|\cos\alpha|} - \frac{1}{\cot\alpha} = \frac{1}{|\cos\alpha|} - \frac{\sin\alpha}{|\cos\alpha|}$

$\frac{\sin\alpha}{\cos\alpha} = ?$

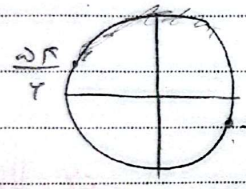
$|\cos\alpha| = \cos\alpha$

$\cos\alpha > 0 \Rightarrow$ ناحیه اول یا چهارم

α در ناحیه اول

سوال ۲: مقدار صحیح m چند است؟ $\quad \sin 2x = \frac{m-1}{2}$

$-\frac{\pi}{12} < \alpha < \frac{5\pi}{12}$ $\quad \times 2 \Rightarrow -\frac{\pi}{6} < 2\alpha < \frac{5\pi}{6}$



$\sin\frac{\pi}{2} = 1$ $\quad -\frac{1}{2} < \sin 2\alpha \leq 1$

$\sin -\frac{\pi}{6} = -\frac{1}{2}$ $\quad -\frac{1}{2} < \frac{m-1}{2} \leq 1 \Rightarrow -2 \leq m-1 \leq 2$

$\sin\frac{5\pi}{6} = \frac{1}{2}$ $\quad -1 < m \leq 3$

$m : (-1, 3] \cap \mathbb{Z}$

سوال ۳: $\tan\alpha + \cot\alpha = -2$ $\quad$ حاصل $\frac{1}{\sin^2\alpha + \cos^2\alpha}$

$2\pi < 4\alpha < 4\pi$ $\quad \frac{2}{\sin 2\alpha} = -2$

$\frac{\pi}{2} < \alpha < \pi$ $\quad \sin 2\alpha = -\frac{2}{3}$

$\sin\alpha + \cos\alpha < 0$

$2\sin\cos\alpha = -\frac{2}{3}$

$-\sin\alpha\cos\alpha = \frac{1}{3}$

$\frac{1}{(\sin\alpha+\cos\alpha)(\sin^2\alpha + \cos^2\alpha - \sin\cos\alpha)}$ $\quad \sin^2\alpha + \cos^2\alpha = 1$

$(\sin\alpha+\cos\alpha)^2 = \sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha = 1 - \frac{2}{3} = \frac{1}{3}$

$\sin\alpha + \cos\alpha = -\sqrt{\frac{1}{3}}$

$= -\frac{\sqrt{3}}{3}$

$\frac{1}{-\frac{\sqrt{2}}{3} \times \frac{2}{3}} = -\frac{9}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = -\frac{3\sqrt{3}}{2}$

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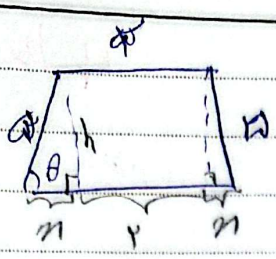
سوال ۴:



$\cos\theta = 0,4$

$\frac{x}{3} = \frac{4}{10} \rightarrow x = 2$ $\quad 25 = h^2 + 9 \rightarrow h = 4$

محاط‌ترین زاویه $= 2 + 3 + 3 = 8$

$S_{\text{دوزنقه}} = \frac{(2+8)\times 4}{2} = 20$

سوال ۵:

$\tan(218^\circ)\tan(-142^\circ) - \sin(109^\circ)\cos(230^\circ) = k\cos^2 19^\circ$

$\tan(\frac{3\pi}{2} + 19^\circ)\tan(-\pi + 19^\circ) - \sin(4\pi + 19^\circ)\cos(\frac{3\pi}{2} - 19^\circ)$

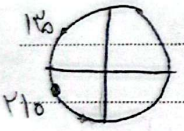
$-\cot(19^\circ)\tan(19^\circ) - \sin(19^\circ)\times - \sin(19^\circ) = -1 + \sin^2 19$

$-\cos^2 19$

$\rightarrow k = -1$

سوال ۶:

$A = \sqrt{2}\cos 110^\circ \sin 245^\circ - \sqrt{2}\sin 135^\circ \cos 315^\circ$



$\sqrt{2}\times - \frac{\sqrt{2}}{2} \times \sin(\frac{3\pi}{2} - 27) - \sqrt{2}(\frac{\sqrt{2}}{2}) \times \cos(\pi - 27^\circ)$

$-\frac{3}{2}\times - \cos 27^\circ - 1\times - \cos 27^\circ = \frac{3\cos 27^\circ}{2} + \cos 27^\circ$

$\frac{\cos 27^\circ(\frac{3}{2} + 1)}{\cos 27^\circ} = \frac{5}{2}$

سوال ۷:

$f(x) = 14\cos^2(3x)\cos^2(9x)\cos^2(12x)\cos^2(24x)$

$f(\frac{\pi}{24}) = ?$ $\quad 14\times \cos^2\frac{\pi}{12} \times \cos^2\frac{\pi}{6} \times \cos^2\frac{\pi}{3} \times \cos^2\frac{2\pi}{3}$ $\quad 120^\circ$

$\cos^2\frac{\pi}{12} = \frac{1+\cos\frac{\pi}{6}}{2} = \frac{1+\frac{\sqrt{3}}{2}}{2} = \frac{2+\sqrt{3}}{4}$

$14\times\frac{2+\sqrt{3}}{4}\times\frac{3}{4}\times\frac{1}{4}\times\frac{1}{4} = \frac{84+42\sqrt{3}}{256}$

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سوال ۸: α در ربع دوم $\frac{1-\sin\alpha}{\sin\alpha+1}=۲$ $\tan\frac{\alpha}{۲}=?$

$\hookrightarrow ۲\sin\alpha+۲=1-\sin\alpha$

$۳\sin\alpha=-۱$

$\sin\alpha=-\frac{۱}{۳}$ $\rightsquigarrow$ $\cos\alpha=-\frac{۲\sqrt{۲}}{۳}$ (ربع دوم)

$\tan^{۲}\frac{\pi}{۲}=\frac{1-\cos\pi}{1+\cos\pi}$

$\frac{1+\frac{۲\sqrt{۲}}{۳}}{1-\frac{۲\sqrt{۲}}{۳}}=\frac{\frac{۳+۲\sqrt{۲}}{۳}}{\frac{۳-۲\sqrt{۲}}{۳}}=\frac{۳+۲\sqrt{۲}}{۳-۲\sqrt{۲}}$

$\tan\frac{\pi}{۲}=-۳$

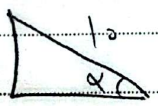
چون $\frac{\alpha}{۲}$ در ربع دوم و تنجانت دوم منفی است

سوال ۹: $\frac{\sin\theta}{1-\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=k\cot\frac{\theta}{۲}$ $k=?$

$\hookrightarrow \cot\frac{\theta}{۲}+\cot\frac{\theta}{۲}=۲\cot\frac{\theta}{۲}-k\cot\frac{\theta}{۲}$

$\hookrightarrow k=۲$

سوال ۱۵: α در ربع دوم $\sin\alpha=\frac{\sqrt{۲}}{۱۰}$



$n\rightarrow 100=۲+n^{۲}\rightarrow n=\sqrt{۹۸}=۷\sqrt{۲}$

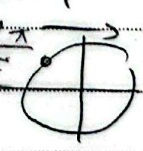
$\cos\alpha=-\frac{\sqrt{۲}}{۱۰}$

$\cos(\frac{۱۱\pi}{۲}+\alpha)=?$

$\hookrightarrow ۵\pi+\frac{۳\pi}{۲}+\alpha$

$\cos(\frac{۳\pi}{۲}+\alpha)=\cos\frac{۳\pi}{۲}\cos\alpha-\sin\alpha\sin\frac{۳\pi}{۲}$

$-\frac{\sqrt{۲}}{۲}\times-\frac{۷\sqrt{۲}}{۱۰}-\frac{\sqrt{۲}}{۱۰}\times\frac{\sqrt{۲}}{۲}=+\frac{۷}{۱۰}-\frac{۱}{۱۰}$



$\cos\alpha=-\frac{\sqrt{۲}}{۲}$

$\sin\alpha=\frac{\sqrt{۲}}{۲}$

$\hookrightarrow \frac{۶}{۱۰}$