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تمرین خارج از کتاب — یازدهم پنجاه و دو ج

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

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

$\cot\alpha = \frac{\cos\alpha}{|\sin\alpha|} \longrightarrow \sin\alpha \geq 0$ I

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

II $\cos\alpha > 0$

I ∩ II ⇒ ربع اول

②

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

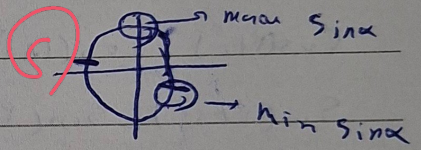
$\sin 2\alpha = \frac{m-1}{2}$ $\quad -\frac{\pi}{12} < \alpha < \frac{3\pi}{12} \longrightarrow -\frac{\pi}{6} < \alpha < \frac{3\pi}{6}$

$-\frac{2\pi}{12} < 2\alpha < \frac{10\pi}{12}$

$-\frac{1}{2} < \frac{m-1}{2} \leq 1$

↳ $-1 < m \leq 3 \longrightarrow (-1, 3]$

⑤



③

$\tan\alpha + \cot\alpha = -2$ $\quad 2\pi < 4\alpha < 4\pi$

$\frac{1}{\frac{\sin^2\alpha+\cos^2\alpha}{\sin\alpha\cos\alpha}} = -2 \longrightarrow \sin\alpha\cos\alpha = -\frac{1}{2}$ $\quad \frac{\pi}{2} < \alpha < \pi$

$\frac{1}{\sin^2\alpha+\cos^2\alpha}$ $\quad -1 < \sin\alpha < \frac{\sqrt{2}}{2}$ $\quad -1 < \cos\alpha < -\frac{\sqrt{2}}{2}$

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

$= -\frac{3\sqrt{2}}{4}$ $\quad A = \sin\alpha + \cos\alpha < 0 \longrightarrow (\sin\alpha+\cos\alpha)^2 = \sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha$

$A^2 = 1 - \frac{2}{3} = \frac{1}{3} \longrightarrow A = -\frac{\sqrt{3}}{3}$ $\quad 1$

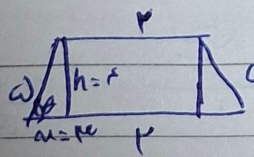
$\longrightarrow \cos\alpha + \sin\alpha < 0$ $\quad \frac{1}{\sin^3\alpha} + \frac{1}{\cos^3\alpha} = \frac{1}{\frac{3\sqrt{2}}{4}} = -\frac{4\sqrt{2}}{3}$

④

$\cos\theta = 0.4$

$\frac{4}{10} = \frac{m}{5}$

$m = 2 \Rightarrow h = 4$



$\frac{(2+(2+2\times 3)\times 4)\times 2}{2} = 20$

①

$S_{\text{ذوزنقه}} = \frac{\text{مجموع قاعده‌ها} \times (\text{ارتفاع})}{2}$

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(k) $\cos^2 1^\circ = \tan(18^\circ)\tan(-17^\circ) - \sin(19^\circ)\cos(25^\circ)$ (2)

$\cos(25^\circ) = \cos(270^\circ - 1^\circ) = -\sin 1^\circ$

$\tan(18^\circ) = \tan(270^\circ + 1^\circ) = -\cot 1^\circ$

$\tan(-17^\circ) = -\tan(180^\circ - 1^\circ) = \tan 1^\circ$

$-\sin(19^\circ) = -\sin(\underbrace{180^\circ}_{4\pi} + 1^\circ) = -\sin 1^\circ$ ✓

$\underbrace{(-\cot 1^\circ)(\tan 1^\circ)}_{-1} + (\sin^2 1^\circ) = -1 + \sin^2 1^\circ$

$-(1 - \sin^2 1^\circ) = -\cos^2 1^\circ$

$k = -1$ (9)

$A = \sqrt{3}\cos(210^\circ)\sin(240^\circ) - \sqrt{2}\sin(135^\circ)\cos(150^\circ) = (k)\cos 27^\circ$ (4)

$\cos(210^\circ) = \cos(180^\circ + 30^\circ) = -\cos 30^\circ = -\frac{\sqrt{3}}{2}$

$\sin(240^\circ) = \sin(270^\circ - 30^\circ) = -\cos 30^\circ$

$\sin(135^\circ) = \sin(180^\circ - 45^\circ) = \sin 45^\circ = \frac{\sqrt{2}}{2}$

$\cos(150^\circ) = \cos(180^\circ - 30^\circ) = -\cos 27^\circ$

$\rightarrow (\sqrt{3})\left(-\frac{\sqrt{3}}{2}\right)(-\cos 27^\circ) - \sqrt{2}\left(\frac{\sqrt{2}}{2}\right)(-\cos 27^\circ)$ (5)

$= \frac{3}{2}\cos 27^\circ + \cos 27^\circ = \frac{5}{2}\cos 27^\circ$ $\quad k = \frac{5}{2}$

$f\left(\frac{\pi}{24}\right) = ?$ $\quad f(\alpha) = 14\cos^2(3\alpha)\cos^2(4\alpha)\cos^2(12\alpha)\cos^2(24\alpha)$ (7)

$3\alpha = \frac{\pi}{12}$, $4\alpha = \frac{\pi}{6}$, $12\alpha = \frac{\pi}{2}$, $24\alpha = \frac{2\pi}{3}$

$14 \times \frac{2+\sqrt{3}}{4} \times \frac{1}{4} \times \frac{3}{4} \times \frac{1}{4} = \frac{7+3\sqrt{3}}{16}$ (5)

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

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$\frac{1-\sin\alpha}{1+\sin\alpha} = 4 \rightarrow$ (ضرب کن) $\tan\frac{\alpha}{2}$

$1-\sin\alpha = 4+4\sin\alpha \rightarrow 5\sin\alpha = -3$

$\sin\alpha = \frac{-3}{5}$

$\sin^2\alpha + \cos^2\alpha = 1$

$\frac{9}{25} + \cos^2\alpha = 1 \rightarrow \cos\alpha = -\frac{4}{5}$ یا $\cos\alpha = \frac{4}{5}$ غ ق ق

$\tan\frac{\alpha}{2} = \frac{\sin\alpha}{1+\cos\alpha} = \frac{\frac{-3}{5}}{1+\frac{-4}{5}} = \frac{\frac{-3}{5}}{\frac{1}{5}} = (-3)$

(۹)

$\frac{\sin x}{1-\cos\alpha} + \frac{1+\cos x}{\sin\alpha}$ (k) $\cot\frac{\alpha}{2}$

$\frac{\sin\alpha}{1+\cos\alpha} = \frac{1-\cos\alpha}{\sin\alpha} = \tan\frac{\alpha}{2}$

$\cot\frac{\alpha}{2} + \cot\frac{\alpha}{2} = 2\cot\frac{\alpha}{2} = k\cot\frac{\alpha}{2} \rightarrow \boxed{k=2}$

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$\sin = \frac{\sqrt{6}}{10}$ $\cos = -\frac{\sqrt{94}}{10}$

$\cos\left(\frac{11\pi}{6}+\alpha\right) = \cos\left(2\pi - \frac{\pi}{6} + \alpha\right) = \cos\left(2\pi - \left(\frac{\pi}{6} - \alpha\right)\right)$

$-\cos\left(\frac{\pi}{2} - \alpha\right) = -\left(\cos\frac{\pi}{2}\cos\alpha + \sin\frac{\pi}{2}\sin\alpha\right)$

$-\left(\frac{\sqrt{2}}{2} \times \frac{-\sqrt{94}}{10} + \frac{\sqrt{2}}{10} \times \frac{\sqrt{2}}{10}\right) = -\left(\frac{-\sqrt{188}+2}{20}\right)$

$= -\left(\frac{-14+2}{20}\right) = -\left(\frac{-12}{20}\right) = \boxed{+\frac{3}{5}}$