۲۰ آفرین!

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

$\cot\alpha \times |\sin\alpha| = \cos\alpha$ } $\sin\alpha = |\sin\alpha|$ ناحیه اول و دوم
$\frac{\cos\alpha}{\sin\alpha} \times |\sin\alpha| = \cos\alpha$ } $\sin\alpha > 0$

$I \cap II \Rightarrow$ ناحیه اول ✓

۱- (۲) تکلیفی شماره ۲۸ امیرحسین A پیر

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

$\frac{\sin\alpha}{|\cos\alpha|} = \tan\alpha \Rightarrow \sin\alpha = \frac{\sin\alpha}{\cos\alpha} \times |\cos\alpha|$

$\cos\alpha = |\cos\alpha| \Rightarrow \cos\alpha > 0$ ناحیه اول و چهارم

۲- (۲)

$-2 < m-1 \leq 4 \Rightarrow -1 < m \leq 5$ ✓

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

$-\frac{\pi}{12} < m < \frac{5\pi}{12} \Rightarrow -\frac{\pi}{6} < 2m < \frac{5\pi}{6}$

۳- (۲)

$\tan\alpha + \cot\alpha = -2$

$\frac{2}{\sin 2\alpha} = -2 \Rightarrow \sin 2\alpha = -1$

$2\sin\alpha\cos\alpha = -1$ (۱)

$(\sin\alpha + \cos\alpha)^2 = 1 + 2\sin\alpha\cos\alpha = 1 - \frac{2}{3} = \frac{1}{3}$ (۲)

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

$\frac{3\pi}{4} < \alpha < \pi$

$\Rightarrow \cos > \sin$

$\sin\alpha + \cos\alpha = -\frac{\sqrt{3}}{3}$ (۳)

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

$= \frac{1}{-\frac{4}{3\sqrt{3}}} = \frac{-3\sqrt{3}}{4}$ ✓

۴- (۲)

$\cos\theta = \frac{a}{5}$

$0/6 = \frac{a}{5} \Rightarrow a = 3$

$\sin^2\theta + \cos^2\theta = 1$ ($\cos^2\theta = 0/36$)

$\sin\theta = 0/8$

$0/8 = \frac{h}{5} \Rightarrow h = 4$

$b = 2a + 2 = 8$

مساحت $S = \frac{(2+8)\times 4}{2} = 20$ ✓

۵- (۲)

$\tan(210^\circ)\tan(-150^\circ) - \sin(1090^\circ)\cos(225^\circ) = k\cos^2 15^\circ$

$\frac{\sin(\frac{3\pi}{2} + 15^\circ)}{\cos(\frac{3\pi}{2} + 15^\circ)} \times \frac{\sin(\pi + 15^\circ)}{\cos(\pi + 15^\circ)} - \sin(4\pi + 15^\circ) \times \cos(\frac{3\pi}{2} - 15^\circ) = k\cos^2 15^\circ$

$\frac{-\cos 15^\circ}{\sin 15^\circ} \times \frac{+\sin 15^\circ}{+\cos 15^\circ} - \sin 15^\circ \times (-\sin 15^\circ) = k\cos^2 15^\circ$

$-1 - (-\sin^2 15^\circ) = \sin^2 15^\circ - 1$

$\sin^2 15^\circ - 1 = k\cos^2 15^\circ$
$-\cos^2 15^\circ = k\cos^2 15^\circ$ } $\Rightarrow k = -1$ ✓

$\sqrt{2}\cos(210^\circ)\sin(240^\circ) - \sqrt{2}\sin(135^\circ)\cos(120^\circ) = n\cos 75^\circ$

$\sqrt{2}\cos(180+30^\circ)\sin(\frac{3\pi}{2}-75^\circ) - \sqrt{2}\sin(45^\circ)\cos(180-75^\circ) = n\cos 75^\circ$

$\sqrt{2}\times -\frac{\sqrt{3}}{2}\times(+\cos 75^\circ) + \sqrt{2}\times\frac{\sqrt{2}}{2}\times(+\cos 75^\circ) = n\cos 75^\circ$

$\frac{\sqrt{6}}{2}\cos 75^\circ + \frac{2}{2}\cos 75^\circ = n\cos 75^\circ$ $\Rightarrow$ $\boxed{n = \frac{\sqrt{6}}{2}+1}$ ✓

$f(m) = 16\cos^2 3m\cos^2 6m\cos^2 12m\cos^2 24m$

$f(\frac{\pi}{24}) = 16\times\cos^2 15^\circ\times\cos^2 30^\circ\times\cos^2 60^\circ\times\frac{\cos^2 120^\circ}{\cos^2 60^\circ}$

$\frac{1+\cos(2\times 15)}{2} = \frac{\sqrt{3}+2}{4}$

$(\frac{\sqrt{3}+2}{4})\times(\frac{\sqrt{3}}{2})^2\times(\frac{1}{2})^2\times(-\frac{1}{2})^2\times 16 =$

$\frac{6+3\sqrt{3}}{16}\times 16 = \boxed{6+3\sqrt{3}}$ ✓ دقت!

$\tan\frac{m}{2} = \frac{\sin m}{1+\cos m} = \frac{1-\cos m}{\sin m}$ ربع ۳

$\frac{1-\sin m}{1+\sin m} = 4$ $\quad 4+4\sin m = 1-\sin m$ $\quad \sin m = -\frac{3}{5}$

$\sin^2 m+\cos^2 m = 1$ $\quad \cos 2\alpha$ $\quad \cos m = -\frac{4}{5}$

$\cos m = \pm\frac{4}{5}$ $\Rightarrow$ ربع ۳

$\tan\frac{m}{2} = \frac{\frac{3}{-4}}{\frac{1}{-5}} = \frac{\frac{3}{4}}{\frac{1}{5}} = \boxed{-3}$ ✓

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

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

دوطرف را معکوس می کنیم $\Rightarrow$ $\frac{1-\cos\alpha}{\sin\alpha} + \frac{\sin\alpha}{1+\cos\alpha} = k\tan\frac{\alpha}{2}$

$\tan\frac{\alpha}{2} + \tan\frac{\alpha}{2} = k\tan\frac{\alpha}{2}$ $\quad \boxed{k=2}$ ✓

α ربع دوم $\quad \sin\alpha = \frac{\sqrt{2}}{10}$

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

$\cos\alpha = \pm\frac{7\sqrt{2}}{10}$ $\Rightarrow$ ربع دوم $\cos<0$ $\quad \cos\alpha = -\frac{7\sqrt{2}}{10}$

$\cos(\frac{11\pi}{4}+\alpha) = \cos(2\pi+\frac{3\pi}{4}+\alpha) = \cos(\frac{3\pi}{4}+\alpha) = \cos(\frac{3\pi}{4})\cos\alpha - \sin(\frac{3\pi}{4})\sin\alpha$

$(+\frac{\sqrt{2}}{2}\times+\frac{7\sqrt{2}}{10}) - (\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{10}) = \frac{7}{10} - \frac{1}{10} = \boxed{0.6}$ ✓