

الف - (۱۷)

امیرعلی تهرانی (پیران ۱۲۰۳)

$$8 \cos \alpha = \cos^2 \alpha = 1 \rightarrow 1 \cos \alpha = \frac{1}{\cos^2 \alpha}$$

$$\rightarrow 1 \cos^2 \alpha = 1 \rightarrow \cos^2 \alpha = \frac{1}{1} \rightarrow \cos \alpha = \frac{1}{1}$$



$$\rightarrow \frac{x}{r}, \frac{y}{r}$$

$$2 \sin^2 \alpha + 1 \cos^2 \alpha = -2 \rightarrow 2 \cos^2 \alpha + 1 (1 \cos^2 \alpha - 1 \sin^2 \alpha) = -2$$

$$\rightarrow 1 \cos^2 \alpha - 2 \cos^2 \alpha - 4 \cos \alpha + 1 = 0 \rightarrow \text{جمع فرجه}$$

$$\begin{array}{l} 1 \cos^2 \alpha - 2 \cos^2 \alpha - 4 \cos \alpha + 1 \\ 1 \cos^2 \alpha - 1 \cos^2 \alpha \end{array} \quad \begin{array}{l} \hline 1 \cos^2 \alpha - 1 \cos^2 \alpha + 1 \\ \hline \end{array}$$

$$\rightarrow \cos^2 \alpha = 1$$

$$\rightarrow \cos \alpha = 1 \rightarrow \alpha = \pi, -\pi$$

$$1 \sin \alpha \cos \alpha + \sin \alpha = 1 \rightarrow 1 \sin \alpha (1 \cos^2 \alpha) + \sin \alpha = 1$$

$$\rightarrow 1 \sin^2 \alpha - 1 \sin^2 \alpha = 1 \rightarrow 1 \sin^2 \alpha - 1 \sin^2 \alpha + 1 = 0$$

$$\rightarrow -\sin(\pi) = -1 \rightarrow \sin \pi = 1 \rightarrow \pi = \frac{1}{2} \pi + \pi$$

$$\rightarrow \frac{1}{2} \pi + \frac{\pi}{4} \rightarrow \frac{3}{4} \pi, \frac{5}{4} \pi, \frac{7}{4} \pi, \frac{9}{4} \pi \rightarrow \frac{1}{4} \pi, \frac{3}{4} \pi, \frac{5}{4} \pi, \frac{7}{4} \pi$$

$$\frac{1}{\sin(\frac{\pi}{2} + 2\alpha)} + \frac{1}{\cos(\frac{\pi}{2} + \pi)} = -1 \rightarrow \frac{1}{\sin \pi} = \frac{1}{\cos(\frac{\pi}{2} + \pi)}$$

$$\rightarrow \cos(\pi - \pi) = \cos(\frac{\pi}{2} + \pi) \rightarrow \pi - \pi = \frac{\pi}{2} + \pi \rightarrow \frac{\pi}{2} = \pi$$

$$\rightarrow \cos \pi = 1 \sin \pi \cos \pi, \pi - \pi = \pi - \frac{\pi}{2} \rightarrow \frac{\pi}{2} - \pi \rightarrow \pi = \frac{\pi}{2}$$

$$\rightarrow \sin \pi = 1 \rightarrow \pi = \frac{\pi}{2}, \frac{3}{2} \pi \rightarrow \alpha = \frac{\pi}{4}$$

$$\rightarrow \frac{1}{\sqrt{2}} = -\sqrt{2}$$

$$\cos\left(n + \frac{\pi}{3}\right) = \frac{1}{\sqrt{3}} \Rightarrow \frac{1}{\sqrt{3}} (\cos n - \sin n) = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \cos n - \sin n = \frac{\sqrt{3}}{3} \Rightarrow m(\cos n - \sin n) - 4\sqrt{4} \sin(n) = \sqrt{4}$$

$$\Rightarrow \frac{m}{\sqrt{3}} - \sqrt{3} \sin n = 1$$

$$(\cos n - \sin n) = \frac{\sqrt{3}}{3} \Rightarrow \cos^2 n + \sin^2 n - 2 \sin n \cos n = \frac{4}{9}$$

$$\Rightarrow \sin n = \frac{\sqrt{3}}{4} \rightarrow \frac{m}{\sqrt{3}} - \sqrt{3} \times \frac{\sqrt{3}}{4} = 1 \rightarrow \frac{m}{\sqrt{3}} - \frac{3}{4} = 1 \rightarrow m = 4$$

$$\sin\left(n + \frac{\pi}{4}\right) \cos\left(n - \frac{\pi}{4}\right) = 1$$

$$\Rightarrow \left(\frac{\sqrt{2}}{2} \sin n + \frac{1}{2} \cos n\right) \left(\frac{1}{2} \cos n + \frac{\sqrt{2}}{2} \sin n\right) = \frac{\sqrt{2}}{2} \cos^2 n + \frac{\sqrt{2}}{2} \sin^2 n + \frac{\sqrt{2}}{2} \sin 2n$$

$$\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} \sin 2n = 1 \Rightarrow \frac{\sqrt{2}}{2} = 1 + \sin 2n \Rightarrow \frac{\sqrt{2}-2}{2} = \sin 2n$$

$$\Rightarrow \sin 2n = \frac{\sqrt{2}-2}{2} \Rightarrow 2n = \arcsin\left(\frac{\sqrt{2}-2}{2}\right) \Rightarrow n = \frac{\arcsin\left(\frac{\sqrt{2}-2}{2}\right)}{2}$$

$$\Rightarrow \left[\frac{\pi}{4}, \frac{3\pi}{4}\right] \rightarrow \text{جواب}$$

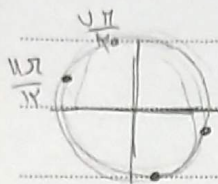
$$\sin n + \sqrt{3} \cos n = \sqrt{2} \Rightarrow \sqrt{2} \sin\left(n + \frac{\pi}{3}\right) = \sqrt{2}$$

$$\Rightarrow n + \frac{\pi}{3} = \frac{\pi}{2} \Rightarrow n = \frac{\pi}{6} \Rightarrow \frac{\pi}{6} = \frac{\pi}{6} \Rightarrow \frac{\pi}{6} = \frac{\pi}{6}$$

$$\Rightarrow \frac{\pi}{6}, \frac{5\pi}{6} \Rightarrow \frac{\pi}{6} = \frac{\pi}{6}$$

$$r \sin \alpha \sin \left(\frac{4\pi}{r} - \alpha \right) = 1 \quad -11$$

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



$$2\alpha = 2k\pi - \frac{\pi}{4} \rightarrow \alpha = k\pi - \frac{\pi}{8}$$

$$2\alpha = 2k\pi - \frac{3\pi}{4} \rightarrow \alpha = k\pi - \frac{3\pi}{8}$$

$$\rightarrow \frac{11\pi}{14} + \frac{5\pi}{14} + \frac{9\pi}{14} + \frac{13\pi}{14} \rightarrow \frac{40\pi}{14} = 2\pi$$

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$$(1 + \cos 2\alpha)(1 + \cos 4\alpha)(1 + \cos 8\alpha) = \frac{1}{\lambda}$$

$$\Rightarrow (r \cos^2 \alpha)(r \cos^2 2\alpha)(r \cos^2 4\alpha) = \frac{1}{\lambda}$$

$$\frac{r \sin^2 \alpha}{r \sin^2 \alpha} \Rightarrow \frac{14 \sin^2 \alpha \cos^2 \alpha \cos^2 2\alpha \cos^2 4\alpha}{r \sin^2 \alpha \cos^2 \alpha} = \frac{r \sin^2 \alpha}{r \cos^2 \alpha}$$

$$\frac{1}{r} \sin^2 14\alpha = \frac{\sin^2 \alpha}{r} \rightarrow \sin^2 14\alpha = \sin^2 \alpha \rightarrow 14\alpha = k\pi \pm \alpha$$

$$\begin{cases} 14\alpha = k\pi + \alpha \rightarrow 13\alpha = k\pi \rightarrow \alpha = \frac{k\pi}{13} \\ 14\alpha = k\pi - \alpha \rightarrow 15\alpha = k\pi \rightarrow \alpha = \frac{k\pi}{15} \end{cases}$$

$$\Rightarrow \boxed{\max \alpha = \frac{11\pi}{13}}$$

این جوابها را به دست آوریم

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$$\tan(r\alpha) \tan \alpha = 1 \rightarrow 1 - \tan 3\alpha \tan \alpha = 0 \rightarrow \tan 4\alpha = \frac{\tan \alpha + \tan 3\alpha}{1 - \tan 3\alpha \tan \alpha}$$

$$\Rightarrow \frac{\tan 4\alpha}{\tan \alpha} = \frac{\sin 4\alpha}{\cos 4\alpha} \rightarrow \cos 4\alpha = 0 \rightarrow 4\alpha = k\pi + \frac{\pi}{2}$$

$$\Rightarrow \alpha = \frac{k\pi}{4} + \frac{\pi}{8} \Rightarrow \frac{9\pi}{8}, \frac{11\pi}{8}, \frac{13\pi}{8}, \frac{15\pi}{8} \rightarrow \frac{11\pi}{8} = 4\pi$$