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دوازدهم

ا) $1 - r \sin^2 n = r \sin n - 1 \rightarrow 0 = r \sin^2 n + r \sin n - r$
 $\rightarrow (\sin n - 1)(\sin n + r) = 0 \rightarrow \begin{cases} \sin n = 1 \\ \sin n = -\frac{1}{r} \end{cases}$

$\begin{cases} n = 2k\pi + \frac{\pi}{2} \\ n = 2k\pi + \frac{5\pi}{2} \end{cases}$

ب) $r \cos^2 n - 1 + \sin n - r = 0 \rightarrow r \cos^2 n + \sin n - r = 0$
 $\rightarrow (\cos n + r)(\cos n - r) = 0 \rightarrow \begin{cases} \cos n = -\frac{r}{r} \\ \cos n = 1 \end{cases}$

$\begin{cases} \cos n = -1 \\ \cos n = 1 \end{cases} \rightarrow \begin{cases} n = 2k\pi \\ n = 2k\pi \end{cases}$

ا) $-\cos n = \sin n \rightarrow -\cos n = r \sin n \cos n$
 $\cos n = 0 \rightarrow n = \frac{\pi}{2} + k\pi$

$-1 = r \sin n \rightarrow \sin n = -\frac{1}{r} \rightarrow n = 2k\pi + \frac{\pi}{2}$
 $n = \frac{\pi}{2} + k\pi \rightarrow n = \frac{\pi}{2} + \frac{k\pi}{r}$



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ب) $\sin n = \frac{1 - r \cos n}{- \cos n}$



$n = -\frac{\pi}{2} + k\pi$

$n = -\frac{\pi}{2} + \frac{k\pi}{r}$

ا) $\sin n \neq 0 \rightarrow \cos n (r \cos n + 1) = 1 \rightarrow r \cos^2 n + \cos n - 1 = 0$
 $\begin{cases} \cos n = -1 \rightarrow n = \pi + 2k\pi \\ \cos n = \frac{1}{r} \rightarrow n = 2k\pi \pm \frac{\pi}{r} \end{cases}$

ب) $\frac{1}{\sin n}$

$r - \cot n + \cot n = \frac{r}{\sin n} = r(1 + \cot n)$

$r - \cot n + \cot n = r + r \cot n \rightarrow 0 = \cot n + \cot n = \cot n (\cot n + 1)$
 $\begin{cases} n = -\frac{\pi}{2} + k\pi \\ n = \frac{\pi}{2} + k\pi \end{cases}$

ا) $\cos(\frac{\pi}{2} + n) \cos(n + \frac{\pi}{2}) = \frac{1}{2} \rightarrow \cos(\frac{\pi}{2} + n) \sin(\frac{\pi}{2} + n) = \frac{1}{2}$
 $\frac{\pi}{2} = \text{loxi}$

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

$n = 2k\pi \pm \frac{\pi}{3} \rightarrow n = k\pi \pm \frac{\pi}{3}$

ب) $\cos(n - \frac{\pi}{4}) = \cos(\frac{\pi}{4} + n) \rightarrow n - \frac{\pi}{4} = 2k\pi + \frac{\pi}{4} + n$
 $n - \frac{\pi}{4} = 2k\pi - \frac{\pi}{4} = n$

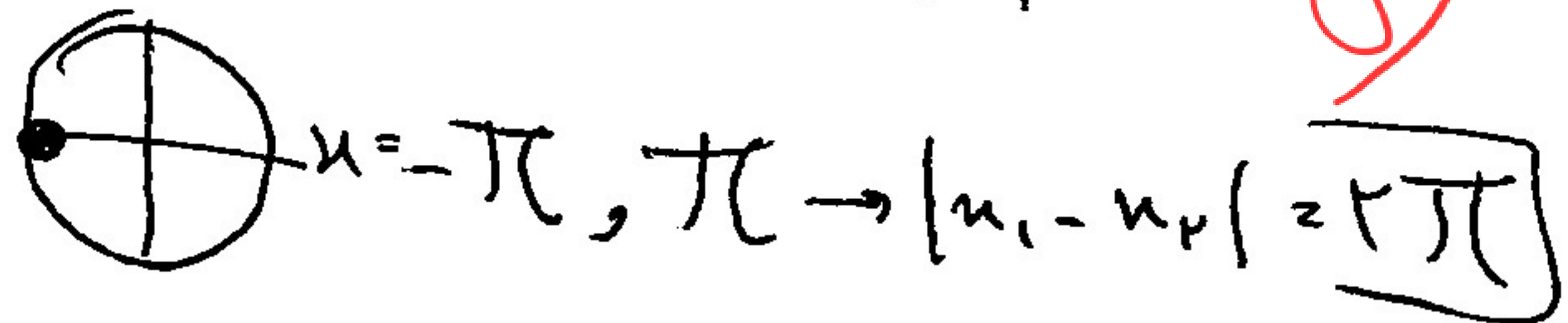
$$1 = r \cos \gamma_m + 1 \quad \square: \sin \gamma_m \neq 0 \rightarrow \gamma_m \neq k\pi \rightarrow n \neq \frac{k\pi}{r} \quad - d$$

$$\rightarrow \cos \gamma_m = 0 \rightarrow \gamma_m = \frac{\pi}{r} + k\pi \rightarrow n = \frac{\pi}{r} + \frac{k\pi}{r}$$

$$\rightarrow \text{for } n \in \mathbb{Z} \{ n \mid n = \frac{\pi}{r} + \frac{k\pi}{r}, k \in \mathbb{Z} \}$$

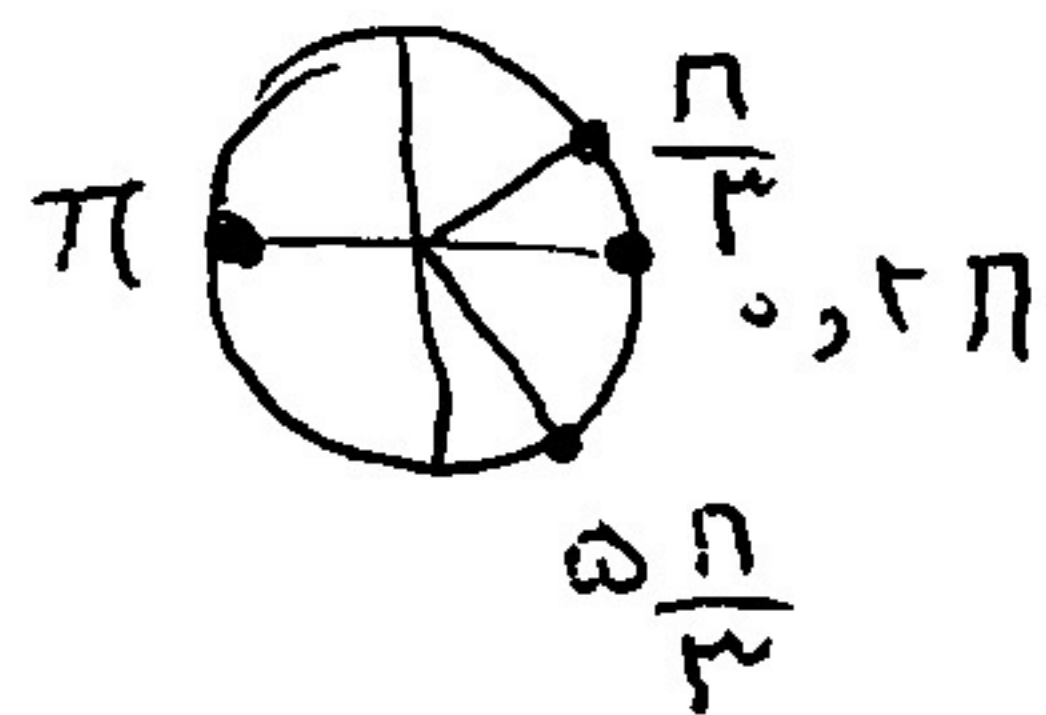
$$\tan \frac{n}{2} = \frac{\cos \frac{n}{r} + 1}{\sin \frac{n}{r}} \rightarrow \tan \frac{n}{2} = \cot \frac{n}{r}$$

$$\frac{n}{2} = \frac{\pi}{r} + \frac{k\pi}{r} \rightarrow n = \pi + k\pi$$



$$\sin^r n = \sin^r n \cos^r \gamma_m = \sin^r n \cdot 1 = \sin^r n$$

$$\begin{cases} n = k\pi \\ \gamma_m = \pi + k\pi \rightarrow n = \frac{\pi}{r} + \frac{k\pi}{r} \end{cases}$$



$$S = 2\pi$$

$$+ \tan(-n + \frac{\pi}{2}) = \tan \gamma_m$$

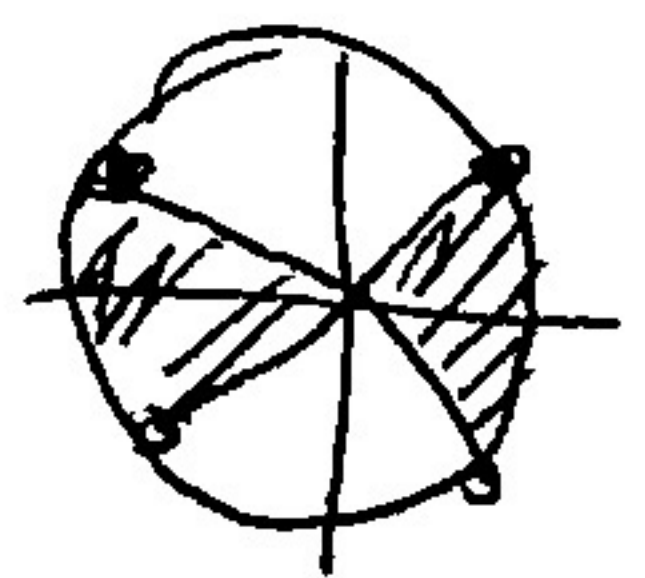
$$\gamma_m = k\pi - n + \frac{\pi}{2} \rightarrow \gamma_m = k\pi + \frac{\pi}{2} - n \rightarrow n = \frac{k\pi}{r} + \frac{\pi}{1/r}$$

$$\cos \gamma_m \geq 0 \rightarrow 1 + \sin \gamma_m = r \cos \gamma_m \rightarrow \sin \gamma_m = r \cos \gamma_m$$

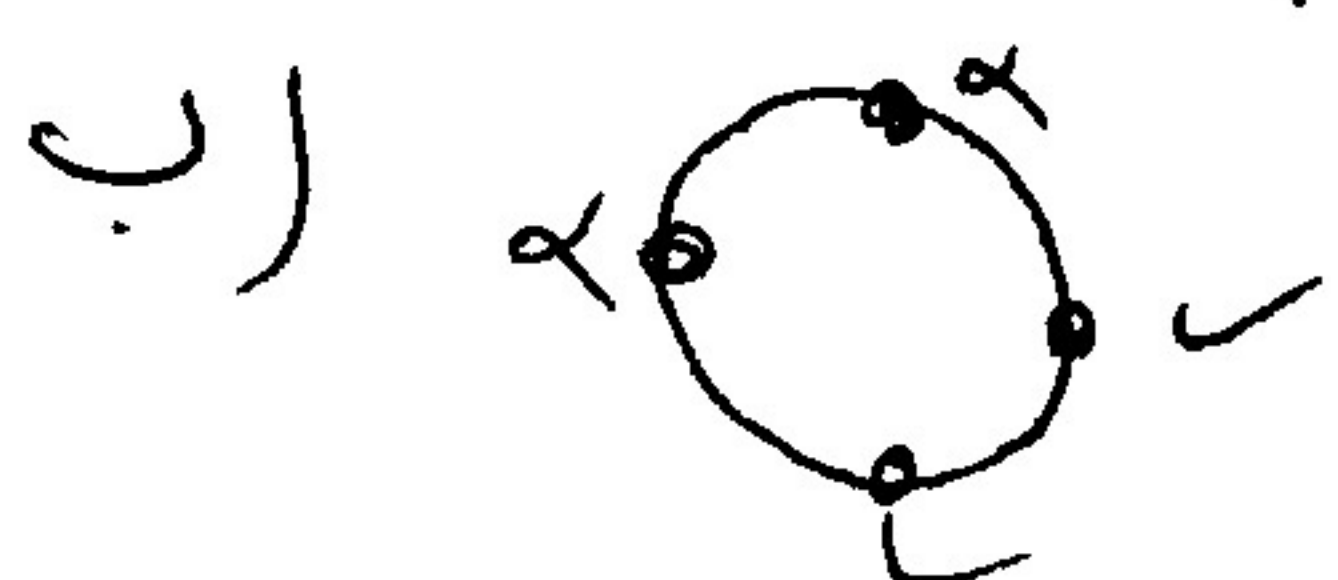
$$\frac{\pi}{r} - \gamma_m = r k \pi + \epsilon_n \rightarrow n = \frac{\pi}{r} + \frac{k\pi}{r}$$

$$\frac{\pi}{r} - \gamma_m = r k \pi - \epsilon_n \rightarrow n = \frac{\pi}{r} - \frac{k\pi}{r}$$

$$n = \frac{r\pi}{r} = \pi$$



$$\text{if } \sin \gamma_m = -1 \rightarrow \gamma_m = \pi + k\pi \rightarrow n = \frac{\pi}{r} + k\pi$$



$$n = 0, \frac{\pi}{r}, 2\pi$$