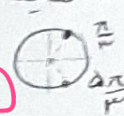


1. $\sec u = 1 + \tan u \Rightarrow \frac{1}{\cos u} = 1 + \tan u \Rightarrow \sec u = 1 + \tan u \Rightarrow \sec u = \frac{1}{\cos u}$
 $u = \pi + \frac{\pi}{4}$ 

2. $\sin(2u) = 2 \sin u \cos u = -1$
 $\sin u \rightarrow 0, \cos u \rightarrow -1$ 

3. $\sin(2u) = 1 \Rightarrow \sin(2u) = 1 \Rightarrow 2u = \frac{\pi}{2} \Rightarrow u = \frac{\pi}{4}$
 $u = \frac{\pi}{4}$ 

4. $\frac{1}{\sin(\frac{\pi}{2} + u)} = \frac{1}{\cos u} \Rightarrow \frac{1}{\sin(\frac{\pi}{2} + u)} = \frac{1}{\cos u} \Rightarrow \frac{1}{\sin(\frac{\pi}{2} + u)} = \frac{1}{\cos u}$
 $\sin(\frac{\pi}{2} + u) = \cos u$
 $\frac{\pi}{2} + u = \frac{\pi}{2} \Rightarrow u = 0$
 $\frac{\pi}{2} + u = \frac{3\pi}{2} \Rightarrow u = \pi$

5. $\sin(u) = \frac{1}{2} \Rightarrow u = \frac{\pi}{6}, \frac{5\pi}{6}$
 $\cos(u) = \frac{\sqrt{3}}{2} \Rightarrow u = \frac{\pi}{6}, \frac{11\pi}{6}$
 $u = \frac{\pi}{6}$

6. $\sin(u + \frac{\pi}{4}) = \frac{1}{2} \Rightarrow \sin(u + \frac{\pi}{4}) = \frac{1}{2} \Rightarrow u + \frac{\pi}{4} = \frac{\pi}{6}, \frac{5\pi}{6}$
 $u = \frac{\pi}{6} - \frac{\pi}{4} = -\frac{\pi}{12}$
 $u = \frac{5\pi}{6} - \frac{\pi}{4} = \frac{7\pi}{12}$

7. $\sin(u) = \frac{1}{2} \Rightarrow u = \frac{\pi}{6}, \frac{5\pi}{6}$
 $\cos(u) = \frac{\sqrt{3}}{2} \Rightarrow u = \frac{\pi}{6}, \frac{11\pi}{6}$
 $u = \frac{\pi}{6}$

8. $\sin(u) = -\frac{1}{2} \Rightarrow u = \frac{7\pi}{6}, \frac{11\pi}{6}$
 $\cos(u) = -\frac{\sqrt{3}}{2} \Rightarrow u = \frac{5\pi}{6}, \frac{7\pi}{6}$
 $u = \frac{7\pi}{6}$

9. $\sin(u) = \frac{1}{2} \Rightarrow u = \frac{\pi}{6}, \frac{5\pi}{6}$
 $\cos(u) = \frac{\sqrt{3}}{2} \Rightarrow u = \frac{\pi}{6}, \frac{11\pi}{6}$
 $u = \frac{\pi}{6}$

$$10- \tan \mu n : \text{at } n \rightarrow \tan \mu n : \tan \left(\frac{\pi}{r} - n \right) \rightsquigarrow \mu n = k\pi + \frac{\pi}{r} - n \quad n = \frac{\pi}{\lambda} (r k + 1)$$

$$\rightsquigarrow \frac{3\pi}{\lambda} \quad \frac{5\pi}{\lambda} \quad \frac{9\pi}{\lambda} \quad \frac{11\pi}{\lambda} \quad \frac{12\pi}{\lambda} \quad \frac{10\pi}{\lambda}$$

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$$\cos 2x = 1 - 2 \sin^2 x \quad (\text{فرمول ظاهری})$$

$$2 \sin x (1 - 2 \sin^2 x) + \sin x = 1 \rightarrow 2 \sin x - 4 \sin^3 x = 1$$

$$\sin^3 x = 1 \rightarrow x = 2k\pi + \frac{\pi}{2} \rightarrow x = \frac{2k\pi}{2} + \frac{\pi}{2} \xrightarrow{0 \leq x \leq 2\pi}$$

$$k=0 \rightarrow x = \frac{\pi}{2}, \quad k=1 \rightarrow x = \frac{5\pi}{2}, \quad k=2 \rightarrow x = \frac{9\pi}{2}$$

$$S = \frac{\pi}{2} + \frac{5\pi}{2} + \frac{9\pi}{2} = \frac{14\pi}{2} = \boxed{\frac{7\pi}{1}}$$

عبارت ۱ را $\frac{1}{r}$ ضرب می‌کنیم. (۷)

$$\frac{1}{r} \sin x + \frac{\sqrt{r}}{r} \cos x = \frac{\sqrt{r}}{r}$$

$$\cos 45^\circ \sin x + \sin 45^\circ \cos x = \frac{\sqrt{r}}{r} \rightarrow \sin \left(x + \frac{\pi}{4} \right) = \frac{\sqrt{r}}{r}$$

$$\left\{ x + \frac{\pi}{4} = 2k\pi + \frac{\pi}{2} \rightarrow x = 2k\pi - \frac{\pi}{4} \xrightarrow{-\pi \leq x \leq \pi} k=0, 1 \rightarrow x = -\frac{\pi}{4}, \frac{7\pi}{4} \right.$$

$$\left\{ x + \frac{\pi}{4} = 2k\pi + \frac{3\pi}{2} \rightarrow x = 2k\pi + \frac{5\pi}{4} \xrightarrow{-\pi \leq x \leq \pi} k=0 \rightarrow x = \frac{5\pi}{4} \right.$$

$$S = \frac{7\pi}{4} - \frac{\pi}{4} + \frac{5\pi}{4} = \frac{11\pi}{4} = \boxed{\frac{11\pi}{4}}$$

$$\sin \left(\frac{5\pi}{4} - x \right) = -\cos x \quad (۸)$$

$$2 \sin x (-\cos x) = 1 \rightarrow -2(\sin x \cos x) = 1 \rightarrow \sin 2x = -\frac{1}{2}$$

$$2x = 2k\pi - \frac{\pi}{6} \leq 2k\pi + \frac{5\pi}{6} \rightarrow x = k\pi - \frac{\pi}{12} \leq k\pi + \frac{5\pi}{12}$$

$$\xrightarrow{0 \leq x \leq 2\pi} \begin{cases} 1 & k=0, 1 \rightarrow x = \frac{11\pi}{12}, \frac{19\pi}{12} \\ 2 & k=1, 2 \rightarrow x = \frac{11\pi}{12}, \frac{19\pi}{12} \end{cases}$$

$$S = \frac{11\pi}{12} + \frac{19\pi}{12} + \frac{11\pi}{12} + \frac{19\pi}{12} = \frac{40\pi}{12} = \boxed{10\pi/3}$$

$$\tan r_n = \frac{1}{\tan n} = \cot n \rightarrow \tan r_n = \tan\left(\frac{\pi}{r} - n\right)$$

(1.)

$$r_n < k\pi + \frac{\pi}{r} - n \rightarrow r_n = k\pi + \frac{\pi}{r} \rightarrow n = \frac{k\pi}{\pi} + \frac{\pi}{\pi}$$

k	r	s	t	v
n	$\frac{9\pi}{\pi}$	$\frac{11\pi}{\pi}$	$\frac{13\pi}{\pi}$	$\frac{15\pi}{\pi}$

$$S = \left(\frac{9+11+13+15}{1}\right)\pi = \frac{48\pi}{1} = \boxed{4\pi}$$