

$$\tan^2 = \frac{\sin^2 u}{\cos^2 u}, \sin^2 u = 1 - \cos^2 u \Rightarrow 1 - \cos^2 u - \frac{1 - \cos^2 u}{\cos^2 u} = 1$$

$$\times \cos^2 u \rightarrow 1 - \cos^2 u - 1 + \cos^2 u = \cos^2 u \Rightarrow 1 - \cos^2 u - 1 = 0 \Rightarrow \cos^2 u = \frac{1}{2}$$

$$\cos u = \pm \frac{1}{\sqrt{2}} \Rightarrow u = \frac{\pi}{4}, \frac{5\pi}{4}$$

$$* \tan u: \frac{\sin u}{\cos u} \Rightarrow \cos u \neq 0 \Rightarrow u \neq \frac{3\pi}{2}, \frac{\pi}{2} *$$

$$\Delta \sin^2(u) + 2 \cos(2u) = 2 \Rightarrow \Delta \sin^2(u) = -2 - 2 \cos(2u) \Rightarrow \Delta \sin^2(u) = -2(1 + \cos(2u))$$

$$\Rightarrow -1 \leq \cos(2u) \leq 1 \Rightarrow 0 \leq \cos(2u) \leq 2 \Rightarrow \leftarrow \text{همواره + یا صفر}$$

$$\Rightarrow \Delta \sin^2(u) = 0 \Rightarrow \sin = 0 \Rightarrow \pi, -\pi$$

$$\Rightarrow -2 - 2 \cos(2u) = 0 \Rightarrow \cos(2u) = -1 \Rightarrow \pi, -\pi \Rightarrow \boxed{\pi, -\pi \text{ جواب دارد}}$$

$$\cos(2u) = 1 - 2 \sin^2 u \Rightarrow 2 \sin u \cos(u) + \sin(u) = 1$$

$$\Rightarrow 2 \sin u \times 2 \sin^2 u + \sin u = 1 \Rightarrow 4 \sin^3 u - 2 \sin^2 u + \sin u = 1$$

$$4 \sin^3 u - 2 \sin^2 u = 1 \Rightarrow \sin(2u) = 1 \Rightarrow 2u = 2k\pi + \frac{\pi}{2}$$

$$\sin(2u) \Rightarrow u = \frac{2k\pi}{2} + \frac{\pi}{4} \Rightarrow \boxed{\frac{\pi}{4} + \frac{2k\pi}{2} + \frac{\pi}{4} = \frac{1+2k}{2} = \frac{2k+1}{2}}$$

۱

۲

۳

۴

۵

$$\sin\left(u + \frac{\pi}{4}\right) \cos\left(u - \frac{\pi}{4}\right) = 1 \Rightarrow \sin a \cos b = \frac{1}{2} [\sin(a+b) + \sin(a-b)]$$

$$\Rightarrow u + \frac{\pi}{4} + u - \frac{\pi}{4} = 2u - \frac{\pi}{4}$$

$$\Rightarrow u + \frac{\pi}{4} - u + \frac{\pi}{4} = \frac{\pi}{2}$$

$$2u - \frac{\pi}{4} = 2k\pi + \frac{\pi}{4}$$

$$\Rightarrow u = k\pi + \frac{\pi}{2} \Rightarrow \frac{\pi}{2}, \frac{3\pi}{2}$$

$$\Rightarrow \frac{1}{2} [\sin(2u - \frac{\pi}{4}) + 1] = 1 \Rightarrow \sin(2k\pi - \frac{\pi}{4}) = 1$$

no

6

7

$$7 \sin u \sin\left(\frac{7\pi}{4} - u\right) = 1 \Rightarrow -7 \sin u \cos u = 1$$

$-\cos u$

$(\sin 2u = 7 \sin u \cos u)$

$\Rightarrow$

$$7) k\pi + \frac{7\pi}{4}$$

$$8) k\pi + \frac{11\pi}{4}$$

$\Rightarrow$

$$\frac{7\pi}{4} + \frac{11\pi}{4} + \frac{19\pi}{4} + \frac{23\pi}{4} = 2\pi$$

$\Leftarrow$

$$-7 \sin 2u = 1$$

$$\sin 2u = -\frac{1}{7}$$

$$2u = \arcsin\left(-\frac{1}{7}\right) + 2k\pi$$

8

9

$$\tan(7u) \tan(u) = 1 \Rightarrow \frac{\sin(7u)}{\cos(7u)} \times \frac{\sin u}{\cos u} = 1 \Rightarrow \cos(7u) \neq 0, \cos u \neq 0$$

$$\Rightarrow \sin(7u) \sin u = \cos(7u) \cos u \Rightarrow \cos(7u) \cos u - \sin(7u) \sin u = 0$$

$$(\cos(a+b) = \cos a \cos b - \sin a \sin b) \Rightarrow \cos(7u+u) = 0 \Rightarrow \cos(8u) = 0$$

$$8u = k\pi + \frac{\pi}{2} \Rightarrow u = \frac{k\pi}{8} + \frac{\pi}{16} \Rightarrow u = \frac{1\pi}{8} + \frac{\pi}{16} = \frac{3\pi}{16} \times \quad u = \frac{5\pi}{8} + \frac{\pi}{16} = \frac{13\pi}{16} \times$$

$$u = \frac{9\pi}{8} + \frac{\pi}{16} = \frac{15\pi}{16} \times \quad u = \frac{11\pi}{8} + \frac{\pi}{16} = \frac{23\pi}{16} + \frac{19\pi}{16} + \frac{15\pi}{16} = \frac{57\pi}{16}$$

10