

1. $\sin \frac{13}{2} \pi = \underline{\hspace{2cm}}, \cos 7\pi = \underline{\hspace{2cm}}, \tan(-405^\circ) = \underline{\hspace{2cm}}, \cos(-\frac{11}{4} \pi) = \underline{\hspace{2cm}}.$

2. 已知 $\cos(75^\circ + \alpha) = \frac{1}{3}$, 则 $\sin(\alpha - 15^\circ) + \cos(105^\circ - \alpha)$ 的值是 $\underline{\hspace{2cm}}.$

3. $\sin^2 1^\circ + \sin^2 2^\circ + \cdots + \sin^2 88^\circ + \sin^2 89^\circ = \underline{\hspace{2cm}}.$

4. 已知 $\sin(-\frac{\pi}{2} - \alpha) \cos(-\frac{5\pi}{2} - \alpha) = \frac{60}{169}$, 且 $\frac{\pi}{4} < \alpha < \frac{\pi}{2}$, 求 $\sin \alpha, \cos \alpha$ 的值.