

$$\frac{\sin \frac{x}{2}}{1 + \cos \frac{x}{2}} = \frac{1 + \cos \frac{x}{2}}{\sin \frac{x}{2}} \Rightarrow \frac{\sin \frac{x}{2}}{1 - \cos \frac{x}{2}} = \cos \frac{x}{2} + \frac{1}{\cos \frac{x}{2}} + 1$$

$$\frac{1}{\cos \frac{x}{2}} + \cos \frac{x}{2} = 0 \Rightarrow \cos \frac{x}{2} (\cos \frac{x}{2} + 1) = 0 \quad \cos \frac{x}{2} = 0 \Rightarrow x = 2k\pi + \pi$$

$$\cos \frac{x}{2} = -1 \Rightarrow \frac{x}{2} = 2k\pi + \pi \Rightarrow x = 4k\pi + 2\pi$$

جواب: $x = 2\pi$

$$\cos^2 x - \sin^2 x \cos^2 x = 1 \Rightarrow -\sin^2 x (1 + \cos^2 x) = 0$$

$$\sin^2 x = 0 \Rightarrow \sin x = 0 \Rightarrow x = k\pi \Rightarrow x = 0, \pi, 2\pi, \dots$$

$$\cos^2 x = -1 \Rightarrow \cos x = \pm i \Rightarrow x = \frac{\pi}{2} + k\pi$$

جواب: $x = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$

$$\frac{\cos x - \sin x}{\cos x} = \frac{\cos x \sin x}{\cos x + \sin x} = \tan x$$

$$1 + \sin^2 x = 2 \cos^2 x \Rightarrow 2 \sin^2 x + \sin^2 x - 1 = 0$$

$$\sin^2 x = -1 \Rightarrow x = k\pi - \frac{\pi}{2}$$

$$\sin^2 x = \frac{1}{2} \Rightarrow x = k\pi + \frac{\pi}{4}, x = k\pi + \frac{3\pi}{4}$$

جواب: $x = \frac{\pi}{4}, \frac{3\pi}{4}, \dots$

$$\sin^2 x - \cos^2 x = 1 \Rightarrow -\cos^2 x = 1 \Rightarrow \cos(\pi - x) = 1$$

$$\pi - x = 2k\pi \Rightarrow x = \pi - 2k\pi \Rightarrow x = \pi, -\pi, \dots$$

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