2.36
5

$$\sin x - \cos x = \sqrt{6}\sin\frac{x}{2} - 1$$

$$\sin\left(2\cdot\frac{x}{2}\right) - \cos\left(2\cdot\frac{x}{2}\right) = \sqrt{6}\sin\left(\frac{x}{2}\right) - 1$$

$$2\sin\frac{x}{2}\cos\frac{x}{2} - \left(1 - 2\sin^2\frac{x}{2}\right) = \sqrt{6}\sin\frac{x}{2} - 1$$

$$\sin\frac{x}{2}\left(2\cos\frac{x}{2} + 2\sin\frac{x}{2} - \sqrt{6}\right) = 0$$

$$\frac{x}{2} = \pi k$$

$$\boxed{x = 2\pi k}$$

$$2\cos\frac{x}{2} + 2\sin\frac{x}{2} = \sqrt{6} \quad / \cdot \frac{\sqrt{2}}{2\sqrt{2}}$$

$$\frac{1}{\sqrt{2}}\sin\frac{x}{2} + \frac{1}{\sqrt{2}}\cos\frac{x}{2} = \frac{\sqrt{3}}{2}$$

$$\cos(45)\sin\frac{x}{2} + \sin(45)\cos\frac{x}{2} = \frac{\sqrt{3}}{2}$$

$$\sin\left(45 + \frac{x}{2}\right) = \sin 60$$

$$\frac{\pi}{4} + \frac{x}{2} = \frac{\pi}{3} + 2\pi k \qquad \frac{\pi}{4} + \frac{x}{2} = \pi - \frac{\pi}{3} + 2\pi k$$

$$x = \frac{\pi}{6} + 4\pi k \qquad x = \frac{5\pi}{6} + 4\pi k$$