

$$\left(\cos\left(\frac{\pi}{4}\right)\right) \Rightarrow f(x) = \begin{cases} \sin x & \text{if } x < \frac{\pi}{4} \\ \cos x & \text{if } x > \frac{\pi}{4} \end{cases}$$

Case I

$$\sin\left(\frac{0.90\pi}{4}\right) = 0.6494$$

$$\sin\left(\frac{0.98\pi}{4}\right) = 0.6959$$

$$\sin\left(\frac{\pi}{4}\right) = 0.7071$$

$$\cos\left(\frac{1.2\pi}{4}\right) = 0.5878$$

$$\cos\left(\frac{1.5\pi}{4}\right) = 0.3827$$

$$\cos\left(\frac{\pi}{4}\right) = 0.7071$$

case II

$$\frac{d}{dx}(\sin x) = \cos x$$

$$\cos\left(\frac{\pi}{4}\right) = 0.7071$$

$$\frac{d}{dx}(\cos x) = -\sin x$$

$$-\sin\left(\frac{\pi}{4}\right) = -0.7071$$

$$\cos\left(\frac{\pi}{4}\right) \neq -\sin\left(\frac{\pi}{4}\right)$$

Thus not continuous

$$\begin{aligned} \therefore \cos\frac{\pi}{4} &= \sin\frac{\pi}{4} \\ &= \underline{\underline{\text{Continuous}}} \end{aligned}$$