

Ex. 6 $y = f(x) = \sqrt{3} \sin x - \cos x, 0 \leq x \leq 2\pi$

$$f'(x) = \sqrt{3} \cos x + \sin x = 0$$

$$\sin x = -\sqrt{3} \cos x$$

$$\tan x = -\sqrt{3}$$

$$x = \frac{2\pi}{3}, \frac{5\pi}{3} \quad \left(\begin{array}{c} \text{inc.} \quad \text{dec.} \\ 0 \quad \frac{2\pi}{3} \quad \frac{5\pi}{3} \quad 2\pi \end{array} \right)$$

$$f''(x) = -\sqrt{3} \sin x + \cos x = 0$$

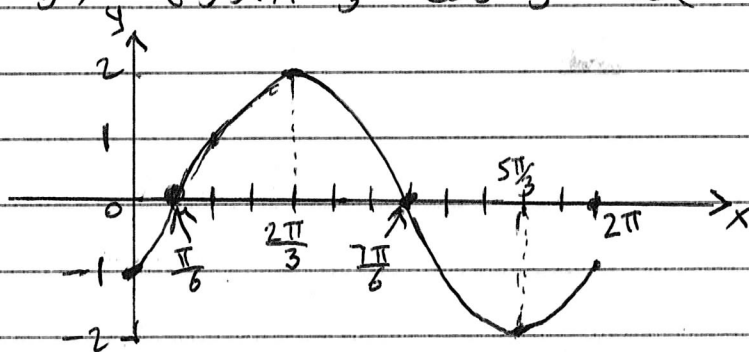
$$\tan x = \frac{1}{\sqrt{3}} \rightarrow x = \frac{\pi}{6}, \frac{7\pi}{6}$$

$$\begin{array}{c} \text{c.u.} \quad \text{c.d.} \quad \text{c.u.} \\ 0 \quad \frac{\pi}{6} \quad \frac{2\pi}{6} \quad 2\pi \end{array}$$

$$f(0) = -1, \quad f(2\pi) = -1$$

$$f\left(\frac{2\pi}{3}\right) = \sqrt{3} \sin \frac{2\pi}{3} - \cos \frac{2\pi}{3} = \sqrt{3} \left(\frac{\sqrt{3}}{2}\right) - \left(-\frac{1}{2}\right) = 2$$

$$f\left(\frac{5\pi}{3}\right) = \sqrt{3} \sin \frac{5\pi}{3} - \cos \frac{5\pi}{3} = \sqrt{3} \left(-\frac{\sqrt{3}}{2}\right) - \frac{1}{2} = -2$$



Also $f\left(\frac{\pi}{3}\right) = \sqrt{3} \left(\frac{\sqrt{3}}{2}\right) - \frac{1}{2} = 1$, etc.

actually
This is $y = 2 \sin\left(x - \frac{\pi}{6}\right)$