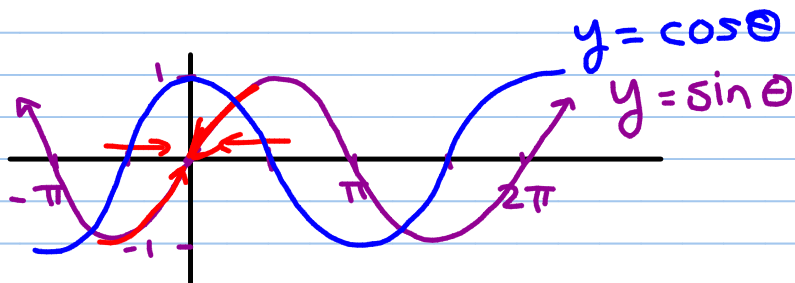


7.1 Limits of Trig Functions

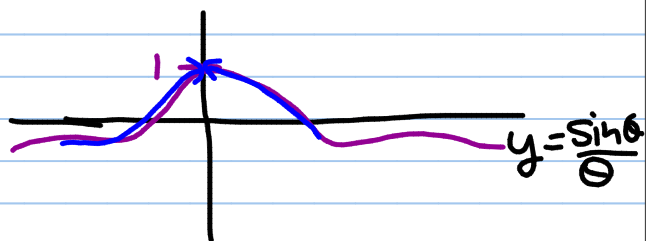
RECALL :



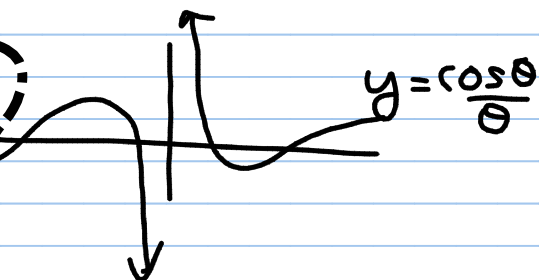
$$\lim_{\theta \rightarrow 0} \sin \theta = 0$$

$$\lim_{\theta \rightarrow 0} \cos \theta = 1$$

$$\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$$



$$\lim_{\theta \rightarrow 0} \frac{\cos \theta}{\theta} \text{ dne}$$



Ex 1 $\lim_{x \rightarrow 0} \frac{\sin x}{2x} = \lim_{x \rightarrow 0} \frac{1}{2} \cdot \frac{\sin x}{x}$

$= \frac{1}{2} \lim_{x \rightarrow 0} \frac{\sin x}{x}$

$= \frac{1}{2} \cdot 1 = \frac{1}{2}$

Ex 2 $\lim_{x \rightarrow 0} 2 \cdot \frac{\sin 2x}{2x} = 2 \cdot \lim_{x \rightarrow 0} \frac{\sin 2x}{2x}$

$= 2 \cdot 1 = 2$

$\lim_{x \rightarrow 0} \frac{\sin \theta}{\theta} = 1$

Ex 3 $\lim_{x \rightarrow 0} \frac{\sin 7x}{\sin 4x} = \lim_{x \rightarrow 0} \frac{7x \cdot \frac{\sin 7x}{7x}}{4x \cdot \frac{\sin 4x}{4x}}$

$= \lim_{x \rightarrow 0} \frac{7x \cdot 1}{4x \cdot 1}$

$= \frac{7}{4}$

$$\text{Ex 4 } \lim_{x \rightarrow 0} \frac{(\cos x - 1) \cdot (\cos x + 1)}{x (\cos x + 1)}$$

$$= \lim_{x \rightarrow 0} \frac{\cos^2 x - 1}{x (\cos x + 1)} = \lim_{x \rightarrow 0} \frac{-\sin^2 x}{x (\cos x + 1)}$$

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

$$= - \lim_{x \rightarrow 0} \frac{\sin x}{x} \cdot \frac{\sin x}{(\cos x + 1)}$$

$$= - \cdot 1 \cdot \frac{0}{1+1}$$

$$= -1 \cdot \frac{0}{2} = 0$$

Now do 7.1!!