

$$\sin(-x) = -\sin(x)$$

$$\cos(-x) = \cos(x)$$

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

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

$$\sin(x) = \frac{\text{opp}}{\text{hyp}}$$

$$\cos(x) = \frac{\text{adj}}{\text{hyp}}$$

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

$$\sin(x) \leq x$$

For small x , $\sin(x) \sim x$

$$\sin(a + b) = \sin(a)\cos(b) + \cos(a)\sin(b)$$

$$\cos(a + b) = \cos(a)\cos(b) - \sin(a)\sin(b)$$

$$\lim_{h \rightarrow 0} \frac{\sin(h)}{h} = 1$$

$$\lim_{h \rightarrow 0} \frac{\cos(h) - 1}{h} = \lim_{h \rightarrow 0} \frac{\cos(h) - 1}{h}$$

Let $f(x) = \cos(x)$.

Then $f'(x) =$

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

Find equation of tangent line to $y = \sin(x)$ at $x = 0$

$$x \rightarrow y = g(x) \rightarrow z = f(y) = f(g(x))$$

$$\text{Chain rule: } [f(g(x))]' = f'(g(x)) \cdot g'(x)$$

$$\frac{dz}{dx} = \frac{dz}{dy} \frac{dy}{dx}$$

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta z}{\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{\Delta z}{\Delta y} \frac{\Delta y}{\Delta x}$$

Examples:

$$[\cos(e^x + 5x^2)]' =$$

$$(x^3[\sin(x^2)][\cos(x^{-1} + 5)])' =$$

$$\left[\sqrt{\frac{\sin(x^{-1})}{e^{x^2}}} \right]' =$$

$$[e^{\sin(e^{x^2+3x})}]' =$$