$sin(-x) = -sin(x)$ $cos(-x) = cos(x)$

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

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

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

$sin(x) \leq x$

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

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

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

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

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

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 $x = 0$

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

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:

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

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

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

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