Section 3.3 *Derivatives of Trigonometric Functions*

Theorem: $\lim_{x\to 0}\frac{\sin x}{x}=1$ and $\lim_{x\to 0}\frac{\cos x-1}{x}=0$

Ex: Prove the following:

a) $f(x)=\sin x \Rightarrow f'(x)=\cos x$

b) $f\left(x\right)=\cos x$ ==> $f'\left(x\right)=-\sin x$

Ex: Differentiate the following functions:

a) $f(x) = (x^2 - 5x + 3)\sin x$

b) $f(x) = \dfrac{e^x \cos x}{3x^3 - 2}$

Using product / quotient rules to find derivative of all trig. Functions.

Ex: Differentiate

a) $f(x) = \left(2x^3 + 2\right)\tan x - \sec\left(x\right) + 4\csc\left(x\right)$

b) $f(x) = \dfrac{\tan x}{\cos x + 2x}$

Ex: Determine equation of tangent line to the curve $y=(x+3)\sin(x)$ at $x=\pi$

Note: $\lim_{x\to 0}\frac{\sin x}{x} \Longrightarrow \lim_{A\to 0}\frac{\sin A}{A}=1$

Ex: Find the limits of the following:

a) $\lim_{x\to 0}\frac{\sin 12x}{x}$

b) $\lim_{x\to 3}\frac{\sin(x-3)}{2x^2-3x-9}$

c) $\lim_{x \to 0} \frac{\sin(3x)}{\sin(4x)}$

d) $\lim_{x \to 0} \frac{\tan(7x)}{x}$

e) $\lim_{x \to 3} \frac{\sin(\pi x)}{x^2 + x - 12}$