3.2 More Derivatives of Sine and Cosine Lesson

This document was composed and formatted by Annie Bernatchez.

The course material originated from www.jensenmath.ca

Reminder of rules:

Rule	Derivative
Power Rule If $f(x) = x^n$	$f'(x) = nx^{n-1}$
Constant Multiple Rule If $f(x) = c \cdot g(x)$ where c is a constant	$f'(x) = c \cdot g'(x)$
Sum Rule If $h(x) = f(x) + g(x)$	$h'(x) = f'(x) + g'(x)$
Difference Rule If $h(x) = f(x) - g(x)$	$h'(x) = f'(x) - g'(x)$
Product Rule If $h(x) = f(x)g(x)$	$h'(x) = f'(x)g(x) + f(x)g'(x)$
Quotient Rule If $h(x) = f(x) \div g(x)$	$h'(x) = \dfrac{f'(x)g(x) - g'(x)f(x)}{[g(x)]^2}$
Power of a Function Rule If $h(x) = [f(x)]^n$	$h'(x) = n[f(x)]^{n-1} \times f'(x)$
Chain Rule If $h(x) = f[g(x)]$	$h'(x) = f'[g(x)] \times g'(x)$

Derivatives of Trig Functions:

- $\frac{d}{dx} \sin x = \cos x$
- $\frac{d}{dx} \cos x = -\sin x$
- $\frac{d}{dx} \tan x = \sec^2 x$

Derivatives of Composite Trig Functions:

- $\frac{d}{dx} \sin f(x) = \cos f(x) \times f'(x)$
- $\frac{d}{dx} \cos f(x) = -\sin f(x) \times f'(x)$
- $\frac{d}{dx} \tan f(x) = \sec^2 f(x) \times f'(x)$

Example 1: Determine the derivative with respect to x

a) $y = \sin(2x)$

b) $y = \sin^2 x$

c) $y = \sin(x^2)$

d) $x^2 \sin x$

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Example 2: Find the derivative with respect to x for each function.

a) $y = \cos(3x)$

b) $f(x) = 2\sin(\pi x)$

c) $g(x) = \tan(x^2 + 3x)$

Example 3: Differentiate with respect to x.

a) $y = \cos^3 x$

b) $f(x) = 2\sin^3 x - 4\cos^2 x$

Example 4: Find each derivative with respect to t.

a) $y = t^3 \cos t$

b) $h(t) = \sin(4t)\cos^2 t$

Example 5: Find the derivative of $y = x\tan(2x - 1)$

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