$$f(x) = 5\sin(3\cos 2x^5)$$

$$f'(x) = 5\cos(3\cos 2x^5)\cdot(-3\sin 2x^5)\cdot(10x^4)$$

$$f(x) = x(\sin x)\sqrt{x-1} = [x(\sin x)](x-1)^{1/2}$$

$$f'(x) = [(x\sin x)]'(x-1)^{1/2} + (x\sin x)[(x-1)^{1/2}]'$$

$$= (1\cdot\sin x + x\cos x)(x-1)^{1/2} + (x\sin x)\left[\frac{1}{2}(x-1)^{-1/2}\right]$$

* $\frac{d}{dx}[\sec x] = \sec x\tan x$

$$f(x) = \sec^2(\sin(3x)) = [\sec(\sin(3x))]^2$$

$$f'(x) = 2\sec(\sin 3x)\cdot\sec(\sin 3x)\tan(\sin 3x)\cdot\cos(3x)\cdot 3$$

u^2

$u = \sec v$

$v = \sin q$

$q = 3x$

$f'(x) = 2u\cdot u'$

$= 2u\cdot\sec v\tan v\cdot v'$

$= 2u\sec v\tan v\cdot\cos q\cdot q'$

$= 2u\sec v\tan v\cdot\cos q\cdot 3$

$$f(x) = \cos\left(\sqrt{\tan^2 x - 2x}\right)$$

$$= \cos\left(\left[(\tan x)^2 - 2x\right]^{1/2}\right)$$

$$f'(x) = -\sin\left(\sqrt{\tan^2 x - 2x}\right) \cdot \frac{1}{2}\left(\tan^2 x - 2x\right)^{-1/2} \cdot \left[2\tan x \cdot \sec^2 x - 2\right]$$

1. $f(x) = \cot(5x^2 - 3x)$

$f'(x) = -\csc^2(5x^2 - 3x) \cdot (10x - 3)$

2. $f(x) = \sqrt[3]{\csc(4x)} = (\csc(4x))^{1/3}$

$f'(x) = \frac{1}{3}(\csc(4x))^{-2/3} \cdot (-\csc 4x \cot 4x) \cdot 4$

3. $f(x) = \frac{\sin 2x}{x^3}$

$f'(x) = \frac{x^3(\sin 2x)' - (\sin 2x)(x^3)'}{(x^3)^2}$

$= \frac{x^3(\cos 2x \cdot 2) - (\sin 2x)(3x^2)}{x^6}$

$= \frac{2x\cos 2x - 3\sin 2x}{x^4}$

OR $f(x) = (\sin 2x)(x^{-3})$

$f'(x) = (\sin 2x)(-3x^{-4}) + (\cos 2x \cdot 2)(x^{-3})$

$= \frac{-3\sin 2x}{x^4} + \frac{2\cos 2x}{x^3} \cdot \frac{x}{x}$

$= \frac{-3\sin 2x + 2x\cos 2x}{x^4}$

$$\frac{d}{dx}\left[2^x\right] = 2^x \cdot \ln 2$$

$$\frac{d}{dx}\left[\log_2 x\right] = \frac{1}{x \cdot \ln 2}$$

$$\log_2 8 = 3 \iff 2^3 = 8$$

$$\log_a b = c \iff a^c = b$$

$$[e^x]' = e^x \cdot \ln e = e^x$$

$$[\ln x]' = \frac{1}{x \ln e} = \frac{1}{x}$$

$$f(x) = \ln[\sin(5x^3+2x)]$$

$$f'(x) = \frac{1}{\sin(5x^3+2x)} \cdot \cos(5x^3+2x) \cdot (15x^2+2)$$

$$= (15x^2+2)\cot(5x^3+2x)$$

$$f''(x) = (30x)\cot(5x^3+2x) + (15x^2+2)(-\csc^2(5x^3+2x)) \cdot (15x^2+2)$$

$$f(x) = (\sec x)(5^{\sin x})$$

$$f'(x) = (\sec x \tan x)\cdot 5^{\sin x} + (\sec x)\cdot(5^{\sin x}\cdot \ln 5 \cdot \cos x)$$

Homework for Test 2 on Derivatives

Homework #4 (due Fri, 09/05)

- 2.2 #3-51 odd — Find derivative using basic rules
- 2.2 #91-94 all; 101,102 — Use derivative to solve rate of change word problems
- 2.3 #1-53 odd, 63-69 odd, 75-81 all, 83-91 odd, 109-115 all — Product and quotient rules
- 2.4 #7-33 odd — Chain rule

Homework #5

- 2.4 #47-81 odd — Chain rule
- 5.1 #45-61, 71 — Logarithmic functions
- 5.4 #39-57 — Exponential functions
- 5.5 #41-55 — Log and exp functions with other bases
- 5.8 #41-59 — Inverse trig functions

Test 2 - on the syllabus for Friday, 09/26, but we will be ready sooner!

Quiz Friday on basic derivatives