$$f(x) = \sqrt[3]{\sin^2(\ln(4x^9))} \qquad (a^m)^n = a^{mn}$$

$$= \left[\left(\sin(\ln(4x^9)) \right)^2 \right]^{1/3}$$

$$= \left[\sin(\ln(4x^9)) \right]^{2/3}$$

$$f'(x) = \boxed{\frac{2}{3}\left[\sin(\ln(4x^9))\right]^{-1/3} \cdot \cos(\ln(4x^9)) \cdot \frac{1}{4x^9} \cdot 36x^8}$$

$$f(x) = 5^{\sqrt[3]{4\log_2(3x^2-4x)}}$$

$$= 5^{(4\log_2(3x^2-4x))^{1/3}}$$

$$f'(x) = \boxed{5^{\sqrt[3]{4\log_2(3x^2-4x)}} \cdot \ln 5 \cdot \frac{1}{3}\left(4\log_2(3x^2-4x)\right)^{-2/3} \cdot 4 \cdot \frac{1}{(3x^2-4x)\ln 2} \cdot (6x-4)}$$

$[x^n]' = nx^{n-1}$

$[cf(x)]' = c \cdot f'(x)$

$[f(x) \pm g(x)]' = f'(x) \pm g'(x)$

$[f(x)g(x)]' = f'g + fg'$

$\left[\frac{f(x)}{g(x)}\right]' = \frac{gf' - fg'}{g^2}$

$[f(g(x))]' = f'(g(x)) \cdot g'(x)$

$[e^x]' = e^x$

$[a^x]' = a^x \ln a$

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

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

$[\sin x]' = \cos x$

$[\cos x]' = -\sin x$

$[\tan x]' = \sec^2 x$

$[\cot x]' = -\csc^2 x$

$[\sec x]' = \sec x \tan x$

$[\csc x]' = -\csc x \cot x$

$[\arcsin x]' = \frac{1}{\sqrt{1-x^2}}$

$[\arctan x]' = \frac{1}{x^2+1}$

$[\text{arcsec}\, x]' = \frac{1}{|x|\sqrt{x^2-1}}$

$[\arccos x]' = -\frac{1}{\sqrt{1-x^2}}$

$[\text{arccot}\, x]' = \frac{-1}{x^2+1}$

$[\text{arccsc}\, x]' = \frac{-1}{|x|\sqrt{x^2-1}}$

$$\arcsin x = \sin^{-1} x \neq \frac{1}{\sin x}$$

2.4 The Chain Rule, cont.

$$(a+b)^2 \neq a^2+b^2$$
$$= a^2+2ab+b^2$$

18. $f(x) = -3\sqrt[4]{2-9x}$ $= -3(2-9x)^{1/4}$

$f'(x) = -3 \cdot \frac{1}{4}(2-9x)^{-3/4} \cdot (-9) = \dfrac{27}{4\sqrt[4]{(2-9x)^3}}$

32. $h(t) = \left(\dfrac{t^2}{t^3+2}\right)^2$

$h'(t) = 2\left(\dfrac{t^2}{t^3+2}\right) \cdot \dfrac{(t^3+2)(2t)-(t^2)(3t^2)}{(t^3+2)^2}$

50. $h(x) = \sec x^2$ $= \sec(x^2)$

$h'(x) = (\sec x^2)(\tan x^2) \cdot 2x$

60. $g(t) = 5\cos^2 \pi t$ $= 5[\cos(\pi t)]^2$ $\cos^2 x = (\cos x)^2$

$g'(t) = 10\cos \pi t \cdot (-\sin \pi t) \cdot \pi$

66. $y = \sin\sqrt[3]{x} + \sqrt[3]{\sin x}$ $= \sin(x^{1/3}) + (\sin x)^{1/3}$

$y' = \cos(x^{1/3}) \cdot \frac{1}{3}x^{-2/3} + \frac{1}{3}(\sin x)^{-2/3} \cdot \cos x$

5.4

46. $g(t) = e^{-3/t^2}$ $= e^{-3t^{-2}}$

$g'(t) = e^{-3t^{-2}} \cdot 6t^{-3}$

Homework for Test #2 on Derivatives

HW #4 (submitted Fri 12/05)

- 2.1 #1-23 odd   Find the derivative by the limit process
- #29-32 all   find the equation of the tangent line
- #61-69 odd   Use the alternate form to find the derivative
- #71-79 odd   Describe x-values where the function is differentiable (given graph)
- 2.2 #3-51 odd   Find the derivative using the basic derivative rules
- #91-94 all; 101, 102   use the derivative to solve rate of change word problems

HW #5 (due Fri 12/12)

- 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, #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