

Find $f'(x)$

$$\frac{2.2}{43.} \quad f(x) = \frac{x^3 - 3x^2 + 4}{x^2}$$

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

$$= x - 3 + 4x^{-2}$$

$$f'(x) = \boxed{1 - 8x^{-3}}$$

$$f(x) = \tan x$$

$$= \frac{\sin x}{\cos x}$$

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

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

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

$$= \frac{1}{\cos^2 x} = \sec^2 x$$

$$\cos^2 x \neq \cos x^2$$

$$\parallel$$

$$\cos(x^2)$$

2.4 - The Chain Rule

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

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

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

$$f'(x) = \left[\cos(x^5 - 3x^2) \right] \cdot (5x^4 - 6x)$$

$$f(x) = \cos[5\sin(7x)]$$

$$f'(x) = -\sin[5\sin(7x)] \cdot 5\cos(7x) \cdot 7$$

$$\begin{aligned} \cos u \\ u = 5 \cdot \sin v \\ v = 7x \end{aligned}$$

$$f(x) = (5x) \cdot (\sin(x^2))$$

$$\begin{aligned} f'(x) &= (5x)' (\sin(x^2)) + (5x) (\sin(x^2))' \\ &= (5)(\sin(x^2)) + (5x)(\cos(x^2) \cdot 2x) \end{aligned}$$

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

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

$$f(x) = (x \sin x) \sqrt{x-1}$$

$$\begin{aligned} f'(x) &= [x \cdot \sin x]' (\sqrt{x-1}) + [x \cdot \sin x] \cdot [(x-1)^{1/2}]' \\ &= (x \cos x + 1 \cdot \sin x) \sqrt{x-1} + x \sin x \cdot \frac{1}{2} (x-1)^{-1/2} \cdot 1 \end{aligned}$$

$$\begin{aligned} f(x) &= \sec^2(\sin(3x)) && (\sec x)' = \sec x \tan x \\ &= [\sec(\sin(3x))]^2 \end{aligned}$$

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

Homework for Test #2 on Derivatives**HW #4 (due 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
- 2.3 #1-53 odd, 63-69 odd, Product and quotient rules
- 75-81 all, 83-91 odd,
- 109-115 all
- 2.4 #7-33 odd Chain rule

HW #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

