**Wed., Sept. 17**

Sec. 3.1 p 133  (Do parts a & b of each problem.)
   1st Definition: 10, 30, 31
   2nd Definition: 16, 20, a, b on back

Sec. 3.3 p 151
   Power Rule: 19, 23, 24, 45, c, d, e
   Trig functions: f, g, h

Handout:  Match the graphs with the graph
   of their derivatives *(Hint: Think about the slope of the original graph.)*

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**Mon., Sept. 22**

Product, Quotient, Chain Rule (problems on back)

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**Wednesday, Sept. 24**

More Chain Rule (problems on back)

Differentials (problems on back)

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**Friday, Sept. 26**

Differentiability Handout  *(Optional Homework (extra credit), but will be tested)*

Review Derivatives

*Journal Due*

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**Tuesday, Oct. 1**

# Derivatives Test

## Day 1 Assignment

(a) $f(x) = 4\cos x$

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

(c) $f(x) = \dfrac{2}{x^2} + 3\sqrt{x}$

(d) $f(x) = (2x^2 + 3)(x^3 - 5)$

(e) $f(x) = \dfrac{4}{3x^5} - 6\sqrt[3]{x^2}$

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

(g) $f(x) = 4\sin x - 3\cot x + 2$

(h) $f(x) = \sin x (2\csc x - \cot x)$

*Hint: Trig identities might be useful.*

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## Day 2 Assignment (Product, Quotient & Chain Rules)

Find $f'(x)$ using the product, quotient or chain rules.

1. $f(x) = (x^3 + 7x^2 - 8)(2x^{-3} + x^{-4})$

2. $f(x) = \left(\dfrac{1}{x} + \dfrac{1}{x^2}\right)(3x^3 + 27)$

3. $f(x) = \dfrac{4x + 1}{x^2 - 5}$

4. $f(x) = \left(\dfrac{3x + 2}{x}\right)(x^{-5} + 1)$

5. $f(x) = \dfrac{\sin x}{x^2 + \sin x}$

6. $f(x) = (x^2 + 1)\sec x$

7. $f(x) = \dfrac{\cot x}{1 + \csc x}$

8. $f(x) = \sec x \tan x$

9. $f(x) = \dfrac{\sin x \sec x}{1 + x \tan x}$

10. $f(x) = \dfrac{(x^2 + 1)\cot x}{3 - \cos x \csc x}$

11. $f(x) = (x^3 + 2x)^{37}$.

12. $f(x) = \dfrac{4}{(3x^2 - 2x + 1)^3}$

*(Quotient rule is not the easiest way.)*

13. $f(x) = \sqrt{4 + \sqrt{3x}}$

14. Find $f''(x)$.

$f(x) = x^2 \cos x + 4\sin x$

Find $\dfrac{dy}{dx}$.

15. $y = (5x + 8)^7 (1 - \sqrt{x})^6$

16. $y = \left(\dfrac{x - 5}{2x + 1}\right)^3$

17. $y = \dfrac{(2x + 3)^3}{(4x^2 - 1)^8}$

Write the equation of the line tangent to the given function at the given value of $x$.

18. $y = \left(x - \dfrac{1}{x}\right)^3$, $x = 2$

19. $y = x^2\sqrt{5 - x^2}$, $x = 1$

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## Day 3 Assignment (More Chain Rule)

Find $f'(x)$

1. $f(x) = \sin\left(\dfrac{1}{x^2}\right)$

2. $f(x) = \tan^4(x^3)$

3. $f(x) = \sqrt{3x - \sin^2(4x)}$

4. $f(x) = \left[x + \csc(x^3 + 3)\right]^{-3}$

Find $\dfrac{dy}{dx}$.

5. $y = x^5 \sec\left(\dfrac{1}{x}\right)$

6. $y = \dfrac{\sin(x^6)}{\sec(3x^2 + 5x^4)^8}$

7. $y = \sin(\tan 3x)^7$

8. $y = \cos^3(\sin 2x)$

9. $y = \left[x + \sin^3(x^5)\right]^{12}$

10. $y = \left[\dfrac{x \sin 2x}{\tan^4(x^7)}\right]^5$

11. Solve with CAS:

$y = \tan^4\left[2 + \dfrac{(7 - x)\sqrt{3x^2 + 5}}{x^3 + \sin x}\right]$

Write the equation of the line tangent to the given function at the given value of $x$.

12. $y = x\cos 3x$, $x = \pi$

13. $y = \tan(4x^2)$, $x = \sqrt{\pi}$

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## Differentials

1. Find $dy$ if $y = \sqrt{3x - 2}$ and $x$ changes from 2 to 2.03.

2. Find $dA$ if $A = 3x^2 - x$ and $x$ changes from 4 to 4.1.

3. The radius of a round manhole cover is estimated to be 16 in., with a maximum error of $\pm 0.06$ in. (a) Use differentials to estimate the maximum error in the area to the nearest hundredth. (b) Approximate the percentage error in the radius and the area to the nearest thousandth of a percent.

4. A spherical balloon is being inflated with gas. (a) Use differentials to approximate the increase in the volume if the diameter changes from 2 ft. to 2.02 ft. to the nearest hundredth. (b) Approximate the percentage error in the radius and the volume to the nearest percent.

5. A metal cube with sides of 15 in. is coated with a sealant 0.01 in thick. Approximate the change in the surface area to the nearest tenth.

6. A metal rod 18 cm long and 5 cm in diameter lies at the bottom of the ocean. It gradually develops a layer of corrosion 0.1 cm thick along its surface. Approximate the change in the volume to the nearest hundredth.