



Thursday, Sept. 22

Sec. 3.1 p 133 (Do parts a & b of each problem.)

1<sup>st</sup> Definition: 10, 30, 31

2<sup>nd</sup> Definition: 16, 20, a, b on back

Handout: Match the graphs with the graph

of their derivatives (*Hint: Think about the slope of the original graph.*)

Sec. 3.3 p 151

Power Rule: 19, 23, 24, 45, c, d, e

Trig functions: f, g, h

Monday, Sept. 26

Product, Quotient, Chain Rule (problems on back)

Wednesday, Sept. 28

More Chain Rule (problems on back)

Differentials (problems on back)

Friday, Sept. 30

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

Review Derivatives

Journal Due

Tuesday, Oct. 4

# Derivatives Test

## Day 1 Assignment

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

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

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

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

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

(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.

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

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

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

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

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

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

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

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

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

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

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

(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  $\frac{dy}{dx}$ .

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

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

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

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

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

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

## Day 3 Assignment (More Chain Rule)

Find  $f'(x)$

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

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

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

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

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

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

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

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

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

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

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

11. Solve with CAS:

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

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

## Differentials

- 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.
- 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.
- 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.
- 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.
- 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.