Math 130 Day 17

Office Hours (LN 301/301.5): M 3:30-4:30, Tu 11:00-1:00, W 12:15-1:15, F 1:30-2:30. Other times by appointment. **Math Intern:** Sun through Thurs: 3:00–6:00, 7:00–10:00pm. **Website:** Use the links at the course homepage on **Canvas** or go to my course Webpage: `http://math.hws.edu/~mitchell/Math130F16/index.html`.

Homework

Today we develop the rule for the derivative of the product of differentiable functions and the derivative of e^{kx} when k is a positive integer. If we have time, we will consider quotients of differentiable functions.

Next time we begin to look at the derivatives of trig functions. And we will look at higher order derivatives (derivatives of derivatives!) Read/Review Chapter 3.4 and begin Chapter 3.5 through page 166.

1. **7-Minute QUIZ ON FRIDAY**. Derivative rules through today's class (including quotient rule, if we get there) and the limit definition of the derivative. Lab is a chance to practice these. **Get to class on time**

2. Practice: Page 160ff #5, 6, 9, 11, 13, 17, 39, 41 (divide through by t^3 to simplify), 45, and 49. Bonus: #63 (Read about higher derivatives in the previous section.)

Review: Trig Functions

This is the time to go back and read Chapter 1.4 on trig functions. This is the best thing you can do for yourself to get ready for trig derivatives.

Hand In at Lab. Name: Answers

Proper Notation. Use proper mathematical grammar. Remember when taking derivatives **NOT** to write expressions such as $f(x) = 6x^2 + 2x = 12x + 2$. The original function is NOT the same as its derivative. What you mean is $f(x) = 6x^2 + 2x$ and so $f'(x) = 12x + 2$ or $\frac{d}{dx}(6x^2 + 2x) = 12x + 2$. (Most of you are doing a good job on this.)

0. Do WeBWorK set Day 17. Due by Sunday night but they would be great practice for the Quiz.

1. For each, write out the answer in the form $\frac{d}{dx}[f(x)] = f'(x)$. Page 160 #46.

$$\frac{d}{dx}\left(3x^2 - 2x + e^{-2x}\right) = 6x - 2 - 2e^{-2x}$$

2. Page 160 #14. Be sure to simplify your answer.

$$\frac{d}{dt}\left(4e^t\sqrt{t}\right) = \frac{d}{dt}\left(4e^t t^{1/2}\right) = 4e^t t^{1/2} + 4e^t \cdot \frac{1}{2}t^{-1/2}$$

$$= 4e^t\left(t^{1/2} + \frac{1}{2}t^{-1/2}\right)$$

OVER

3. Page 160 #44. Be sure to simplify your answer.

$$\frac{d}{dt}\left(2te^{t/2}\right) = 2\cdot e^{t/2} + 2t\cdot\frac{1}{2}e^{t/2}$$

$$= e^{t/2}(2+t)$$

4. If we get to quotients: Page 160 #26. Be sure to simplify your answer.

$$\frac{d}{dw}\left(\frac{w^2-1}{w^2+1}\right) = \frac{2w(w^2+1)-(w^2-1)2w}{(w^2+1)^2} = \frac{2w^3+2w-2w^3+2w}{(w^2+1)^2}$$

$$= \frac{4w}{(w^2+1)^2}$$

5. If we get to quotients: Determine the derivative of $f(t) = \dfrac{2x^4+x}{e^{3x}}$.

$$\frac{d}{dt}\left(\frac{2t^4+t}{e^{3t}}\right) = \frac{(8t^3+1)e^{3t}-(2t^4+t)3e^{3t}}{(e^{3t})^2}$$

$$= \frac{8t^3+1-(2t^4+t)3}{e^{3t}}$$

$$= \frac{-6t^4+8t^3-3t+1}{e^{3t}}$$

6. Look in the front of your text. Write out the Addition Formula for $\sin(x+h)$ and for $\cos(x+h)$.

$$\sin(x+h) = \sin x\cos(h) + \cos x\sin(h)$$

$$\cos(x+h) = \cos x\cos(h) - \sin x\sin(h)$$