Test 2 Practice, Math 1410

Fall 2017, Dr. Graham-Squire

•Test 2 covers material from Section 3.1 to 3.8. It is possible that the limit definition of the derivative could show up on this test, but if so it would be in the context of proving a derivative rule (as we did at times in the notes or on quizzes). Unless otherwise stated, though, you can assume that you can use the derivative rules to solve any problems on this test. There will be approximately 8 to 10 questions on the test, and you will have the whole period to work on it.

•To study, you should read over your notes, try to re-work old HW and quiz problems, and work on practice problems out of the textbook. You can look at the questions at the end of Chapter 3. You can also use the Test material on my website and on blackboard, but not all of the questions match. Here are the different test and which questions will match:

Fall 2015 Test #2: all questions match.

Spring 2014 Test #2: questions 2-9

Spring 2013 All of Test #2. Test #3: questions 7 and 8

Fall 2011 Test #1: question 4. Test #2: questions 1-7, 9, 10

•It can be helpful to rewatch the video lectures, and/or look at a copy of the blank notes and try to work the examples and exercises. I also post the old Written Assignments (often with an answer key), and those are good for practice as well.

•A calculator might be useful for certain questions, but you will still need to show your work to get full credit. There will be at least one question where you cannot use a calculator.

•Below are some problems to work on to practice for the test. Be forewarned, though, that THE QUESTIONS ON THE TEST WILL NOT NECESSARILY BE THE SAME AS THE ONES BELOW! There are a variety of questions that I can ask, and the ones below are just a sample. If you just work the problems below, that does <u>not</u> mean that you are completely prepared for the test. If you get stuck on any of the problems below, that probably indicates an area where you should study some more.

1. A particle moves along a horizontal line so that after t seconds its position is given by

$$s(t) = \frac{5}{3}t^3 - 10t^2 + 15t$$

When is the particle moving left? Note: positive direction is to the right, so increasing = moving right. (Note: you should <u>use the derivative rules</u> to solve this question, and every question after this one. You do not have to use the definition of the derivative).

2. Find y' if $y = \dfrac{e^{-x}\cos x}{\ln x}$

3. Find the x-coordinate(s) when the given function has a horizontal tangent line

$$T(x) = x^2 e^{1-3x}$$

Hint: It will help to simplify the derivative by factoring. You can check your answer by graphing the function.

4. Find $\dfrac{dy}{dx}$ if $y = \sqrt[3]{x + \sqrt{2\sec x}}$

5. Find y' if $\ln(xy) = e^{2x}$

6. Calculate $\dfrac{d}{dx}\tan(\arctan x)$ two different ways- First take the derivative and then simplify your answer. Next, simplify the expression first and then take the derivative. (Hint: $\cos(\arctan x) = \dfrac{1}{\sqrt{1+x^2}}$....do you know how to prove it?)

7. Use logarithmic differentiation to find $\dfrac{d}{dx}(x^{\ln\sqrt{x}})$

8. The volume of a right circular cone is given by $V = \frac{1}{3}\pi r^2 h$, where r is the radius and h is the height of the cone.

(a) Find the rate of change of the volume with respect to the radius, assuming the height is held constant.

(b) Find the rate of change of the volume with respect to the height, assuming the radius is held constant.

(c) Suppose $r = 3$ and $h = 4$. If you wanted to increase the volume the greatest amount, would it be more beneficial to increase the radius slightly or the height slightly? Use your results from parts (a) and (b) to explain your answer.