

Business Calculus Test 2 Review

Dr. Graham-Squire, Summer Session 1, 2012

- The test will cover sections 2.6, 3.1-3.7, 4.1 and 4.2.
- To study, you should look over your notes, rework HW problems on WebAssign, quizzes, and problems from the notes, as well as work out the practice problems given for each section. The Review Questions at the end of Chapter 3 are also good practice (as well as some of the review questions at the end of chapters 2 and 4, but not all of them).
- Calculators are allowed on this test, but for certain questions you will not be allowed to use a calculator. It is highly recommended that you bring a calculator because you cannot use cell phones or computers during the test.
- If asked to calculate a derivative using the limit definition, you must have the formula memorized (I will not write it on the board as I did for the quiz).
- Some Practice Problems to work on:

1. Use the limit definition of the derivative to calculate $f'(x)$ if $f(x) = \frac{1}{2x+3}$.
2. Find the derivative of each function:
 - (a) $f(x) = (3x^4 - 7)(x^2 + 9)$. Simplify your answer.
 - (b) $f(x) = (x^3 - 7x + 9)^7$. You do not need to simplify.
 - (c) $f(x) = \left(\frac{x^3 - 9}{x + 4}\right)^3$. Simplify your answer by combining like terms.
 - (d) $f(x) = (x + 7)^4(3x^2 - 4)^2$. Simplify your answer by factoring completely.
3. The quantity x of TV sets demanded each week is related to the wholesale price by the equation $p = -0.006x + 180$. The weekly total cost for producing x sets is given by $C(x) = 0.00002x^3 - 0.02x^2 + 120x + 60,000$.
 - (a) Find the revenue function $R(x)$ and the profit function $P(x)$.
 - (b) Compute the marginal revenue, cost, and profit functions.
 - (c) Compute $R'(2000)$, $C'(2000)$, and $P'(2000)$ and interpret your results. What does that information tell the company about how many TV sets they should produce?
4. The number of people receiving disability benefits from 1990 through 2000 is approximated by the function

$$N(t) = 0.00037t^3 - 0.0242t^2 + 0.52t + 5.3 \quad (0 \leq t \leq 10)$$

where $N(t)$ is measured in units of a million and t is measured in years with $t = 0$ being 1990. Compute $N(8)$, $N'(8)$, and $N''(8)$ and interpret your results. What does that information tell you about what was happening with disability benefits at that time, and what might it imply for the future?

5. Elmo and Cookie Monster are both leaving Sesame Street in their cars. Elmo leaves at noon and drives straight north at 35 mph. Cookie leaves an hour later (at 1 pm) and drives straight east at 40 mph. How fast are the two monsters moving away from each other at 3 pm?
6. Let f be the function defined by $y = f(x) = \frac{2x^2 + 1}{x + 1}$. Find the differential of f and use it to find the approximate change in y if x changes from 1 to 1.1.
7. For each function, find
- (a) the intervals where the function is increasing or decreasing,
 - (b) any relative maximum or minimum points (if any),
 - (c) the intervals where f is concave up or down, and
 - (d) inflection points (if any). For fun, you can also
 - (e) sketch a graph of the function from the information you found, then compare to what you get when you put it into a graphing calculator.

(i) $f(x) = x^4 - 2x^2$

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