Business Calculus Test 3 Review

Dr. Graham-Squire, Fall 2012

●The test will cover sections 3.6, 3.7, 4.1, 4.2, 4.4, 4.5, 5.1, 5.2, and 5.3.

●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 Chapters 3, 4, and 5 are also good practice (thought not all of them will be covered on this test).

●On my website, the most closely related tests are: Summer 2007 (Test 2: #2,3,4,5,6,7), Summer 2008 (Test 2: #1,2,3,5,7,8), and Summer 2012 (Test 2: # 1,2,3,5; Test 3:# 1,2,3,8)

●Calculators <u>are</u> allowed on this test, but for certain questions you will not be allowed to use a calculator. It is <u>highly</u> recommended that you bring a calculator because you cannot use cell phones or computers during the test.

●Some practice problems to work on:

1. Find $\dfrac{dy}{dx}$ for the equation $x^3 + xy^2 + y^3 = 0$.

2. Let f be the function defined by $y = f(x) = \dfrac{2x^2 + 1}{x + 1}$. Find the differential of f and use it to find the approximate change in y if x changes from 1 to 1.1.

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

4. Find the absolute maximum and minimum (if they exist) of the function $g(x) = x\sqrt{4 - x^2}$ on the interval [0,2].

5. A rectangular box is to have a square base and a volume of 20 ft^3. If the material for the base costs 30 cents/ft^2, the material for the top costs 20 cents/ft^2, and the material for the sides costs 20 cents/ft^2, determine the dimensions of the box that give a minimum cost. Check your answer to make sure it is a minimum.

6. The number of internet users in China is approximated by the function
$$N(t) = 94.5e^{0.2t} \qquad\qquad (1 \le t \le 6)$$
   where $N(t)$ is measured in millions and t is years with $t = 1$ being 2005.
   (a) How many users are there in 2010?
   (b) When did the number of users equal 190,300,000?

7. Expand and simplify the expression $\ln\left(\dfrac{x^2 \cdot e^{3x}}{\sqrt{x}(1+x)^2}\right)$.

8. Find the interest rate needed for an investment of \$4000 to double in 5 years if interest is compounded continuously.

$$\dfrac{x^2 \cdot e^{3x}}{2\,(1+x)^2}$$