# Business Calculus Test 2 Review

Dr. Graham-Squire, Fall 2014

•The test will cover sections 2.4 through 2.6 and 3.1 through 3.6.

•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 2 and 3 are also good practice (though some of them cover other material).

•The following questions from Fall 2012 match with this test: Test 2: #1-4, 6-9, Test 3: #6

•The following questions from Summer 2012 match with this test: Test 1: #4, 5, and 6, Test 2: #4, 6, 7, and 8

•All the questions from Summer 2008, Test 1, match this test.

•Even though we know the shortcut methods to take derivatives, you may be asked to take a derivative using the limit definition on this test. SO YOU MUST KNOW HOW TO DO THE 4-STEP PROCESS FOR THIS TEST.

•Calculators <u>are</u> allowed on this test, but for certain questions you may not be allowed to use a calculator.

•Some practice problems to work on:

1. Find the limits. If the limit does not exist, write DNE and explain why.

   (a) $\lim_{x\to 2} \dfrac{x^2+4x-12}{x^2-2x}$.

   (b) $\lim_{x\to(-1)} \dfrac{x^2}{x+1}$.

   (c) $\lim_{x\to\infty} \dfrac{3x^4-3x}{7x^2-11x^4+4}$.

2. Let $f(x) = \begin{cases} 2x+3 & \text{if } x<-1 \\ x^2 & \text{if } -1\le x\le 2 \\ 3 & \text{if } x>2 \end{cases}$

   Find the value of the following limits. If the limit does not exist, write DNE and explain why.

   (a) $\lim_{x\to(-1)^-} f(x)$.

   (b) $\lim_{x\to(-1)^+} f(x)$.

   (c) $\lim_{x\to 2^-} f(x)$.

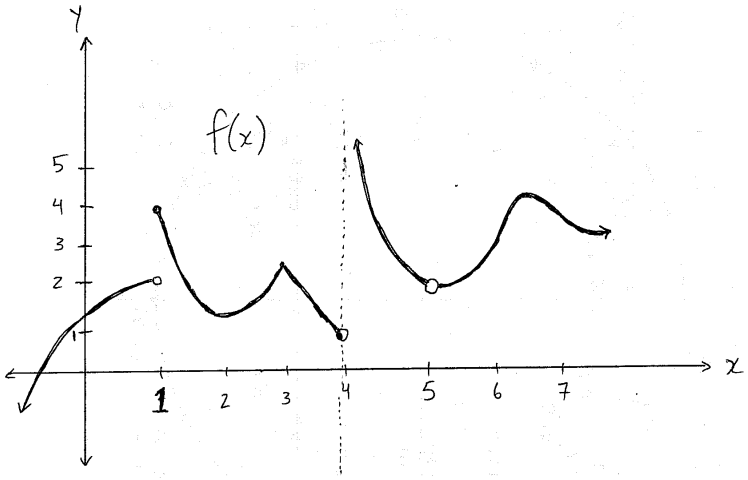
   (d) $\lim_{x\to 2^+} f(x)$.

   (e) $\lim_{x\to 1^-} f(x)$.

   (f) $\lim_{x\to\infty} f(x)$.

3. Use the limit definition of the derivative to calculate $f'(x)$ if $f(x) = \dfrac{1}{2x+3}$.

4. Find the given limits for the following diagram. If the limit does not exist, write DNE and explain why.




(a) $\lim_{x\to 1^+} f(x) =$

(b) $\lim_{x\to 4^-} f(x) =$

(c) $\lim_{x\to 4^+} f(x) =$

(d) $\lim_{x\to 5} f(x) =$

5. 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) $f(x) = \left(\dfrac{x^3 - 9}{x + 4}\right)^3$. Simplify your answer by combining like terms.

   (d) $f(x) = (x + 7)^4(3x^2 - 4)^2$. Simplify your answer by factoring completely.

6. 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, marginal cost, and marginal 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?

7. The number of people receiving disability benefits from 1990 through 2000 is approximated by the function

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

   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?

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