Name(Print) _____ Lecture Time_____

Signature _____ Instructor_____

General Calculus - MATH 205, Fall 2007
Exam III, Fall 2007

page	1	2	3	4	5	6	7	8			Total
points											

1. Show the details of your work under each question. 2. Clearly label your answer and your exposition may have effect on grading. 3. Each problem is worth 10 points, except for #2 (20 points) and #3 (20 points).

1. (a) State the definition of elasticity

(b) The demand curve for a product is $q = 1000 - 3q^2$, where p is the price. Find the elasticity at $p = 5$.

(c) Interpret your answer from (b), and decide whether the company should increase the price in order to increase revenue.

2. (a) State the general form of a logistic function and sketch a rough graph.

(b) The sales of a product for a company is given by the following table.

time t	0	1	2	3	4	5	6	7	8	9
total sales	0	46	110	192	364	636	840	1016	1020	1028

Estimate the total sales. You must explain why in order to receive full credit.

3. The following figure is a contour diagram of the monthly payment on a 5-year car loan as a function of the interest rate and the amount you borrow. The interest rate is 13% and you borrow \$6000.

picture from page 356 here.

(a) what is your monthly payment: _____?

(b) If interest rates drop to 11%, how much more can you borrow without increasing your monthly payment?

(c) If you borrow \$7000, what the interest rate needs to be without increasing your monthly payment?

4. Using the contour diagram for $f(x, y)$ to find the following partial derivatives

picture from page 365 , # 1 here.

(a) $f_x(5, 2) =$

(b) $f_x(3, 1) =$

(c) $f_y(1, 3) =$

(d) $f_y(4, 0) =$

5. Find the partial derivatives f_x and f_y of the following functions.

(a) $f(x, y) = x + y + 1$

(b) $f(x, y) = xy + 1$

(c) $f(x, y) = x^3 + x^2y + 1$

(d) $f(x, y) = 10x^2e^y + x - y$

(e) $f(x, y) = x^{2/3}y^{3/4}$

6 (a) Let $f(x, y) = xe^y$, find f_{xx}, f_{xy}, f_{yy}.

(b) Let $f(u, v) = e^{uv}$ Find f_{uv}

7. Find the values of x and y which maximize $f(xy) = 400 - 3x^2 - 4x + 2xy - 5y^2 + 48y$. Explain the details.

(Hint: the second derivative test claims that, let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}(x_0, y_0)^2$. (1) if $f_{xx}(x_0, y_0) > 0$, $D > 0$, then f has a local min at (x_0, y_0); (2) if $f_{xx}(x_0, y_0) < 0$, $D > 0$, then f has a local max at (x_0, y_0).)

8. Use Lagrange multipliers to find the maximum or minimum values of $f(x, y) = x^2 + 4xy$ subject to constraint $x + y = 100$.

   (Hint: equations you may need to use: $f_x = \lambda g_x$, $f_y = \lambda g_y$, $g = c$.)