Math 212 Spring 2015

Quiz **7**

Multivariable Calculus
**Prof. Ron Buckmire**

**Name**: _____

Assigned: **Wednesday March 18**

Due: **Monday March 23**

Time Begun: _____
Time Ended: _____

## Topic : Unconstrained Multivariable Optimization

The idea behind this quiz is to provide you with an opportunity to demonstrate your understanding of how to find the maximum or minimum of a multivariable function.

## Reality Check:

EXPECTED SCORE : _____**/10**

ACTUAL SCORE : _____**/10**

## Instructions:

1. Once you open the quiz, you have **30 minutes** to complete, please record your start time and end time at the top of this sheet.
2. You may use the book or any of your class notes. You must work alone.
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one. QUIZZES WITH UNSTAPLED SHEETS WILL NOT BE GRADED.
4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.
5. Your solutions must have enough details such that an impartial observer can read your work and determine HOW you came up with your solution.
6. Relax and enjoy...
7. **This quiz is due at the beginning of class on Monday March 23.**
   NO LATE OR UNSTAPLED QUIZZES WILL BE ACCEPTED FOR GRADING.

**Pledge:** I, _____, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

**1.** Consider the function $S(x, y) = 3xe^y - x^3 - e^{3y}$.

**(a)** (*2 points*) Compute $\vec{\nabla} S$.

**(b)** (*2 points*) Use your answer from **(a)** to show that there is only one critical point of $S(x, y)$, at the point $(1, 0, 1)$.

**(c)** (*4 points*) Use the second derivative test $D = f_{xx}(a, b)f_{yy}(a, b) - f_{xy}^2(a, b)$ to classify the critical point you found in part **(b)** as a **local maximum** of $S(x, y)$.

**(d)** (*2 points*) Is the local maximum you found in part **(c)** also a global maximum of $S(x, y)$? EXPLAIN YOUR ANSWER AND THEN COMPARE AND CONTRAST THIS SITUATION INVOLVING A MULTIVARIABLE FUNCTION WITH ONE CRITICAL POINT THAT IS A LOCAL MAXIMUM WITH A SIMILAR SITUATION OF A SINGLE VARIABLE FUNCTION WITH A SINGLE CRITICAL POINT THAT IS A LOCAL MAXIMUM.