Math 212 Spring 2015

BONUS Quiz **2** | Multivariable Calculus

Name: ______________________________ Assigned: **Friday March 27**

Due: **Monday March 30**

Time Begun: ____________________
Time Ended: ____________________ **Prof. Ron Buckmire**

Topic : Constrained Multivariable Optimization (Using Lagrange Multipliers)

The idea behind this bonus quiz is to provide you with an opportunity to illustrate your understanding of constrained multivariable optimization and Lagrange Multipliers.

Reality Check:

EXPECTED SCORE : __________**/5** ACTUAL SCORE : __________**/5**

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. NO LATE OR UNSTAPLED QUIZZES WILL BE ACCEPTED.
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 bonus quiz is due on Monday March 30**, at the beginning of class.

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. The goal of this problem is to show that the maximum volume of a rectangular box without a lid which can be made from 12 m^2 of cardboard is 4 m^3. Let x, y and z be the length, width and height of the box, respectively.

(a) (*1 point*) Write down the objective function $f(x, y, z)$ to be optimized.

(b) (*1 point*) Write down the constraint function $g(x, y, z)$ that your objective is subject to.

(c) (*2 points*) Using the method of Lagrange Multipliers, write down the set of equations that need to be solved in order to maximize f subject to the constraint g. **How many equations in how many unknowns will you have?**

(d) (*1 point*) Solve the system of equations you wrote in **(c)** to find the dimensions of the rectangular box without lid with maximum volume with surface area 12 m^2.