Math 212 Spring 2006

BONUS Quiz **7** **Multivariable Calculus**

Name: _____

Date: _____ **Friday March 24**
Time Begun: _____ Ron Buckmire
Time Ended: _____

Topic : Method of Lagrange

The idea behind this quiz is to provide you with an opportunity to illustrate your understanding of the Method of Lagrange for constrained multivariable optimization.

Reality Check:

EXPECTED SCORE : _____**/10** ACTUAL SCORE : _____**/10**

Instructions:

0. Please look for a hint on this quiz posted to `faculty.oxy.edu/ron/math/212/06/`.
1. Once you open the quiz, you have as much time as you like to complete it, 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 loose 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 on Monday March 27**, in class. NO LATE QUIZZES WILL BE ACCEPTED.

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.

Math 212 Spring 2006 **SHOW ALL YOUR WORK** **BONUS** Quiz Seven

1. Consider the Cobb-Douglas production function $P = bL^{\alpha}K^{1-\alpha}$ where the total production P of a certain product depends on the amount of labor L used and the amount K of capital investment ($0 < \alpha < 1$ and $b > 0$.)
If the cost of a unit of labor is m and the cost of unit of capital is n, given that a company can only spend p dollars as its total budget, then maximizing the production P is subject to the constraint $mL + nK = p$.

(a) (*5 points.*) Write down the three equations which need to be solved in order to maximize P subject to the constraint $p = mL + nK$ when using the Method of Lagrange. (Why are there three equations?)

(b) (*5 points.*) Show that the maximum production $P(L, K)$ occurs when $L = \dfrac{\alpha p}{m}$ and $K = \dfrac{(1-\alpha)p}{n}$.