Math 212 Spring 2006

Quiz **11** **Multivariable Calculus**

Name: _____

Date: _____ **Friday April 21**
Time Begun: _____ Ron Buckmire
Time Ended: _____

Topic : Path Integrals

The idea behind this quiz is to provide you with another opportunity to illustrate your ability to compute path integrals.

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 **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 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 April 24**, 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** Quiz **Eleven**

1. Consider the vector field $\vec{F}(x, y) = (1 - ye^{-x}, e^{-x})$.

(a) *(5 points.)* Show that the line integral of $\vec{F}$ along the straight line path from $(0, 1)$ to $(1, 2)$ is $2e^{-1}$. [HINT: $\int u\, e^u\, du = ue^u - e^u$]

(b) *(3 points.)* Show that this vector field is a **gradient field**, in other words there exists a function $f(x, y)$ such that $\vec{\nabla} f = \vec{F} = (1 - ye^{-x}, e^{-x})$.

(c) *(2 points.)* Use the Fundamental Theorem for Path Integrals to show that the value of the path integral of $\vec{F}$ from $(0, 1)$ to $(1, 2)$ is the same regardless of the path taken.