Math 126 - Spring 2011
Exam 2
May 12, 2011

Name: _____

Section: _____

Student ID Number: _____

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- You are allowed to use a scientific calculator (**NO GRAPHING CALCULATORS**) and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.
- Check that your exam contains all the problems listed above.
- Clearly put a box around your final answers and cross off any work that you don't want us to grade.
- Show your work. The correct answer with no supporting work may result in no credit. Guess and check methods are not sufficient, you must use appropriate methods from class.
- Unless otherwise indicated, your final answer should be given in exact form whenever possible.
- Cheating will not be tolerated. Keep your eyes on your exam!
- You have 50 minutes to complete the exam. Use your time effectively, spend less than 10 minutes on each page and make sure to leave plenty of time to look at every page. Leave nothing blank, show me what you know!

GOOD LUCK!

1. (a) (7 pts) A particle is moving according to the position vector function $\mathbf{r}(t) = \langle e^t, 3t, e^{-2t} \rangle$. Find all values of t at which the tangential component of acceleration is zero.

(b) (7 pts) Find the equation for the tangent plane to $g(x, y) = \dfrac{\sqrt{x^3 + 1}}{2y} + e^{xy}$ at $(0, 1)$. Then use the tangent plane as a linear approximation to approximate the value of $g(0.1, 0.9)$.

2. (9 pts) Let $f(x, y) = x^2y - x^2 - 2y^2$. Find and classify all critical points of $f(x, y)$. (Classify using appropriate partial derivative tests).

3. (a) (7 pts) Set up and evaluate a double integral to find the volume of the solid below the surface $z + 3x^2 - 5y^2 = 12$ and bounded by the planes, $x = 0$, $x = 2$, $y = 0$, $y = 3$ and $z = 0$.

(b) (7 pts) Evaluate the integral by reversing the order of integration: $\int_0^2 \int_x^2 e^{y^2}\, dydx$.

4. (13 pts) For both questions below, consider the region $D = \{(x, y) \mid x \leq 0,\ y \geq 0,\ x^2 + y^2 \leq 9\}$.

   (a) (7 pts) Find the absolute maximum and absolute minimum of $f(x, y) = yx^2 + 10$ over D.

   (b) (6 pts) Using polar coordinates, evaluate: $\iint_D y + \sqrt{x^2 + y^2}\, dA$.