**Math 126F** **Second Midterm** **Spring 2013**

Your Name

Your Signature

Student ID #

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| | Ru Yu | | Chris | |
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| Section | 1:30 | 2:30 | 1:30 | 2:30 |
| (circle one) | FA | FB | FC | FD |

| Problem | Total Points | Score |
|---|---|---|
| 1 | 16 | |
| 2 | 9 | |
| 3 | 8 | |
| 4 | 8 | |
| 5 | 9 | |
| Total | 50 | |

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Graphing calculators are not allowed.
- In order to receive credit, you must show your work. Explain why your answers are correct.
- If you use a trial and error (or guess and check) method when a calculus method is available, you will not receive full credit.
- **Place a box around $\boxed{\text{YOUR FINAL ANSWER}}$ to each question.**
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1 (16 points) Evaluate the following double integrals.

(a) (8 points) $\iint_R x \sec^2(xy)\, dA, \quad R = [0, \pi/4] \times [0, 1]$

(b) (8 points) $\iint_D 2xy\, dA$ $D$ is the triangle with vertices $(0, 0)$, $(1, 2)$ and $(0, 3)$.

2 (9 points) Find the absolute maximum of the function $f(x, y) = x + 2y - xy$ on the closed rectangular region with vertices $(0, 0)$, $(0, 2)$, $(3, 0)$ and $(3, 2)$.

3 (8 points) If three resistors with resistances $R_1$, $R_2$ and $R_3$ are connected in parallel, then the total resistance $R$ of the circuit is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

Suppose that the resistances are measured in ohms with $R_1 = 25$, $R_2 = 40$ and $R_3 = 50$, and that there is a possible error of 0.5 ohms in each measurement. Use differentials to estimate the maximum error in the calculated value of $R$.

4 (8 points) Find all the points on the curve $r = 1 + \cos\theta$ where the tangent line is horizontal.

5 (9 points) Let $\mathbf{r}(t) = 3t^2\,\mathbf{i} + t^3\,\mathbf{j} + 3t^2\,\mathbf{k}$. Find all times $t$ when the normal component of acceleration is equal to 8.