Math 53 Midterm #1, 2/27/07, 3:40 PM − 5:00 PM
(no leaving the exam between 4:45 and 5:00)

No calculators or notes are permitted. Please write your solution to each of the 7 questions on a separate sheet of paper with your name, GSI, and SID number on it. Each of the 7 questions is worth 10 points. To get full credit for a question, you must obtain the correct answer, put a box around the correct answer, and show correct work. (To avoid losing points, cross out incorrect work.) Good luck!

1. Find the plane that contains the point $(1, 2, 3)$ and the line $x = y = z$. (Write your answer in the form $ax + by + cz = d$.)

2. Find parametric equations for the tangent line to the curve

$$x = t^2 - 1, \qquad y = t^2 + 1, \qquad z = t + 1$$

   at the point $(-1, 1, 1)$.

3. Suppose z is a function of x and y defined implicitly by

$$e^{yz} = x + z.$$

   Calculate $\partial z / \partial y$ when $x = 2$ and $y = 0$. (Your answer should be a number.)

4. Find the area of the surface obtained by rotating the curve

$$x = 3t - t^3, \qquad y = 3t^2, \qquad 0 \le t \le 1$$

   around the x-axis.

5. Either compute the following limit, or explain why it does not exist:

$$\lim_{(x,y) \to (0,0)} \frac{(x + y)^2}{x^2 + y^2}.$$

6. At what angle do the lines $2x + y = 3$ and $3x - y = 4$ intersect?

7. (a) Sketch the curve given in polar coordinates by $r^2 = \cos \theta$.

   (b) Find the area of the region enclosed by this curve.