**Mathematics 16B** **February 15, 2006**
**Sarason**

# MIDTERM EXAMINATION 1

Name (Printed): _____

Signature: _____

SID Number: _____

GSI (check one):
- ☐ Tom Dorsey
- ☐ Zak Mesyan
- ☐ David Penneys
- ☐ Arun Sharma

| | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| TOTAL | |
| GRADE POINTS | |

Section Number or Time: _____

Put your name on every page.

**Closed book** except for crib sheet. No calculators.

**SHOW YOUR WORK.** Cross out anything you have written that you do not wish the grader to consider. Make sure the grader can easily spot your final answer(s) to each question, for example by boxing the answers.

The points for each problem are in parentheses. Perfect score = 65.

*Name* _____ 

1. (15) For which values of $a$ and $b$ does the straight line $y = ax + b$ give the best least-squares approximation to the data points $(0, 0)$, $(1, 2)$, $(2, 3)$?

*Name* _____



2. (20) For the function $f(x, y) = x^3 + y^3 - 12x - 27y$:

   (a) Determine the critical points.

   (b) Determine which critical points, if any, are saddle points.

*Name* _____ 

3. (15) Evaluate the integral $I = \iint_R (x^2 - y)dxdy$, where the region $R$ is defined by the inequalities $0 \leq y \leq 1$, $x^2 \leq y$.

*Name* _____ 

4. (15) According to U.S. postal regulations, a rectangular package whose three side lengths measure $x$ inches, $y$ inches, $z$ inches, must satisfy $2x + 2y + z \leq 84$. Which values of $x, y, z$ give the dimensions of a package whose diagonal has maximum length? (The length of the diagonal equals $\sqrt{x^2 + y^2 + z^2}$.)