

**MATH 16C:
FAKE TEST 2B**

SPRING 2007

- (1) Consider the following equation

$$6x^2 - 9y^2 + 3z^2 = 3.$$

To understand the graph corresponding to the equation above, sketch the following traces: (Be sure to label the axes!)

- a) Sketch the yz traces corresponding to $x = -1$, $x = 0$, and $x = 1$.
- b) Sketch the xz traces corresponding to $y = -1$, $y = 0$, and $y = 1$.
- c) Sketch the xy traces corresponding to $z = -1$, $z = 0$, and $z = 1$.

- (2) Find all first order partial derivatives of

$$f(x, y) := \frac{x^2}{\sqrt{y}} - e^{\sqrt[3]{x-y^2}} + \cos(2\sqrt{xy}).$$

- (3) Find and classify all critical points of

$$f(x, y) := 3x^2y + y^3 - 3x^2 - 3y^2 + 2.$$

- (4) Find the minimum of the function

$$f(x, y, z) := x^3 + y^3 + z^3$$

subject to the constraint

$$x^2 + y^2 + z^2 = 12.$$

Assume $x \geq 0$, $y \geq 0$, and $z \geq 0$.

(5) Calculate the following integral

$$\int_0^1 \int_{1-x}^{1+x} (2x - 3y^2) dy dx .$$