

**Math 163A****Guide for Test 4**

Here are some sample questions from old tests. Some topics that we covered are not represented by these questions, but are still fair game.

1. A company wishes to manufacture a box with a volume of  $6 m^3$  that is open on top and has a square base. The material for the bottom of the box costs \$3 per  $m^2$ , while the material for the sides costs \$2 per  $m^2$ . Find the dimensions of the box that will lead to minimum total cost. What is the minimum total cost?
2. Find the absolute maximum and minimum of the function  $f(x) = 2x^3 - 3x^2 - 12x + 5$  on the interval  $[-2, 0]$ .
3. Graph and label the level curves at  $z = -1$ ,  $z = 1$ , and  $z = 2$  for the equation  $zx^2 - y = 0$ .
4. Let  $f(x, y) = x(y^2 + 3)^5 + \frac{1}{y} + 2x^6 - 9$ . Compute:
  - (a)  $f_x(x, y) =$
  - (b)  $f_y(x, y) =$
  - (c)  $f_{xx}(x, y) =$
  - (d)  $f_{xy}(x, y) =$