

1. (25) Find an equation for the tangent plane to

$$z = x^2 + xy + y^2 - 6x + 2$$

at (4, 3, 15).

2. (25) The volume of a right circular cone with base radius r and height h is

$$V = \frac{1}{3}r^2h.$$

Suppose the radius is measured to be 6 inches \pm .2 inches, and the height is measured to be 12 inches \pm .3 inches. Use differentials to estimate the maximum possible error in the calculated volume.

3. (25) A rectangular box is to have volume 48 cubic feet, and is made of three different grades of material. The material for the front and back costs \$1 per square foot, the material for the top and bottom costs \$2 per square foot, and the material for the two ends costs \$3 per square foot. What are the dimensions of the box of minimal cost?

4. (25) Let $g(x, y) = y - x^2$ and let $f(x, y) = x^2 + (y-1)^2$.

a. On the axes provided, sketch the parabola $g(x, y) = 0$ and sketch **two** level curves of $f(x, y)$.

b. Use the method of LaGrange multipliers to find the minimum value of $f(x, y)$ subject to $g(x, y) = 0$.

Answers to Test II

1. $z = 15 + 5(x - 4) + 10(y - 3)$
2. 13.2
3. The dimensions are 2' by 4' by 6'
4. The minimum value is 3/4.

