

Name:

Score:

Math 1321    Week 9 Lab    Due Thursday 3/27

Concept Review

1. (*True or Not True. Explain*) If  $f(x, y) \rightarrow L$  as  $(x, y) \rightarrow (a, b)$  along every straight line through  $(a, b)$ , then  $\lim_{(x,y) \rightarrow (a,b)} f(x, y) = L$
  
2. (*True or Not True. Explain*) If  $f_x(a, b)$  and  $f_y(a, b)$  both exist, then  $f$  is differentiable at  $(a, b)$ . (Hint: review section 11.4, theorem 8)
  
3. (*True or Not True. Explain*) If  $f(x, y)$  has two local maxima, then  $f$  must have a local minimum. Justify your answer with a picture.

4. **(Lagrange Multipliers)** Use Lagrange Multipliers to find the point(s) furthest from and closest to the origin on the curve  $x^6 + y^6 = 1$ . Draw a picture to support your calculation.
5. **(Lagrange Multipliers)** The density of a metallic spherical surface  $x^2 + y^2 + z^2 = 4$  is given by  $\rho(x, y, z) = 2 + xz + y^2$ . Find the places where the density is the highest and the lowest. (Hint: there are two minima and two maxima).