Quiz 4

Name: _____ Section and/or TA: _____

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. (2 points) Consider the function $f(x,y) = \sqrt{x^2+y^2}$.

   (a) (1 point) Describe the level curves of this function.

   Solution: The level curves are circles of radius k.

   (b) (1 point) Describe the shape of the graph of f.

   Solution: The graph of f is a cone.

2. (3 points) Prove that the following limit does not exist. [Hint: choose two paths $(x,y) \to (0,0)$, and show they have different limiting values.]

$$\lim_{(x,y)\to(0,0)} \frac{6x^5+y^4}{3x^5+y^2}$$

Solution: Along the path $x = 0$, we have

$$\lim_{y\to 0} \frac{y^4}{y^2} = 0,$$

while along the path $y = 0$, we have

$$\lim_{x\to 0} \frac{6x^5}{3x^5} = \frac{6}{3} = 2.$$

Thus the limit does not exist.