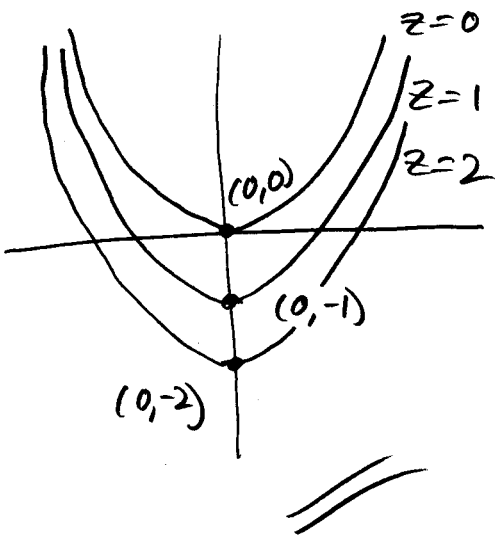
MATH 213 – QUIZ 5 – 28 FEBRUARY 2008

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (5 pts.) Sketch the level curves for the function $f(x,y) = x^2 - y$ corresponding to the values $z = 0$, $z = 1$, and $z = 2$. Label at least one point on each of the level curves.



$z = 0$: $x^2 - y = 0$

$y = x^2$

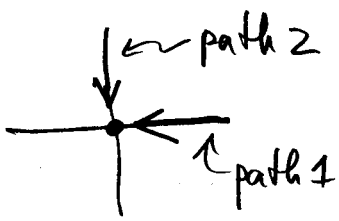
$z = 1$: $x^2 - y = 1$

$y = x^2 - 1$

$z = 2$: $x^2 - y = 2$

$y = x^2 - 2$

2. (5 pts.) Show that $\lim_{(x,y)\to(0,0)} \frac{x^2}{x^2+y^2}$ does not exist.



path 1: $y = 0$

$$\lim_{x\to 0^+} \frac{x^2}{x^2+y^2} = \lim_{x\to 0^+} \frac{x^2}{x^2} = \lim_{x\to 0^+} 1 = 1$$

path 2: $x = 0$

$$\lim_{y\to 0^+} \frac{x^2}{x^2+y^2} = \lim_{y\to 0^+} \frac{0}{y^2} = 0$$

Different limits from different paths $\Rightarrow$ limit does not exist