Math 397 Spring 2016 Solutions **Quiz 11** Name Caleb McWhorter
Section 4

Show all work. Incomplete answers may receive little or no credit.

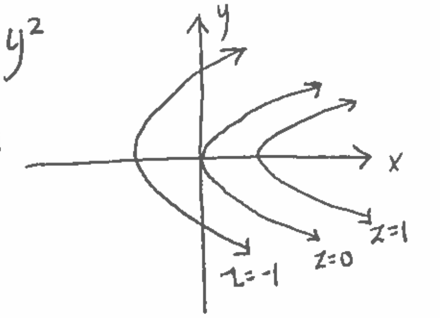
1. Draw and label with their k-values 3 level curves in the xy-plane for $g(x,y) = x - y^2$

$Z = x - y^2$

$Z=0: \quad x = y^2$

$Z=-1: \quad x = y^2 - 1$

$Z=1: \quad x = y^2 + 1$



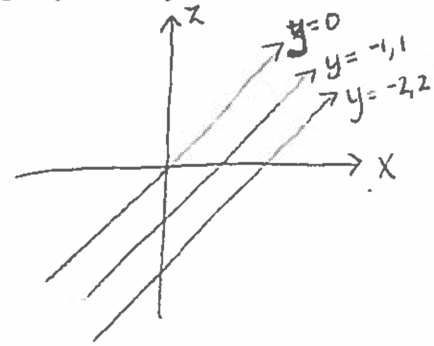
Taking slices in y:

$y=0: \quad z = x$

$y=-1: \quad z = x-1$

$y=1: \quad z = x-1$

$y=2: \quad z = x-4$



2. For each of the following limits, either compute its value or show that it does not exist.

(a) $\displaystyle \lim_{(x,y)\to(0,0)} \underbrace{\frac{x^2+y^2+6}{\cos(6x^2+y^2)}}_{f(x,y)} = \frac{0+0+6}{\cos(0+0)} = 6/\cos 0 = 6$. This is the limit as $f(x,y)$ is continuous at $(0,0)$.

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

x-axis $(y=0)$: $\displaystyle \lim_{(x,y)\to(0,0)} \frac{0}{3x^4+0} = 0$

y-axis: $\displaystyle \lim_{(x,y)\to(0,0)} \frac{0}{0+y^4} = 0$

$x=y$: $\displaystyle \lim_{(x,y)\to(0,0)} \frac{2x^3 \cdot x}{3x^4+x^4} = \lim_{(x,y)\to(0,0)} \frac{2x^4}{4x^4} = 1/2$

But $1/2 \neq 0$, therefore the limit does not exist.

(c) $\displaystyle \lim_{(x,y)\to(2,1)} \frac{xy-2y+4x-8}{x-2}$

$x=2$: $\displaystyle \lim_{(x,y)\to(2,1)} \frac{2y-2y+4(2)-8}{2-2} = \frac{0}{0}$ Tells nothing

$y=1$: $\displaystyle \lim_{(2,1)} \frac{x-2+4x-8}{x-2} = \lim_{(x,y)\to(2,1)} \frac{5x-10}{x-2} = 5$

Limit possibly 5. Should try to show this.

$\displaystyle \lim_{(x,y)\to(2,1)} \frac{xy-2y+4x-8}{x-2} = \lim_{(x,y)\to(2,1)} \frac{y\cancel{(x-2)}+4\cancel{(x-2)}}{\cancel{x-2}}$

$\displaystyle = \lim_{(x,y)\to(2,1)} y+4$

$= 1+4 = 5$