Quiz 4
Math 202 F01

Name: Solutions
02/22/06

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

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

As $(x,y)\to(0,0)$ along the x-axis, so $y=0$, $\frac{x^2+2y^2}{2x^2+y^2} = \frac{x^2}{2x^2} = \frac{1}{2}$ so the function $\to \frac{1}{2}$

As $(x,y)\to(0,0)$ along the y-axis, so $x=0$, $\frac{x^2+2y^2}{2x^2+y^2} = \frac{2y^2}{y^2} = 2$ so the function $\to 2$

Since $\frac{1}{2} \neq 2$, this limit D.N.E.

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

Since $\frac{x^3+xy^2}{x^2+y^2} = \frac{x\cancel{(x^2+y^2)}}{\cancel{(x^2+y^2)}} = x \to 0$ as $(x,y)\to(0,0)$

the limit is 0

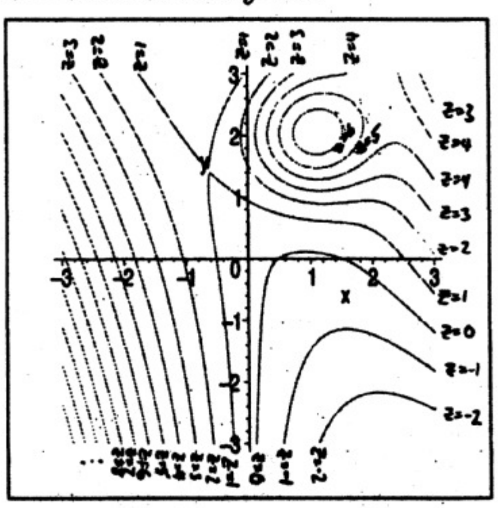
(c) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{x^2}{x^2+y^2}$

As $(x,y)\to(0,0)$ along x-axis $\frac{x^2}{x^2+y^2} = \frac{x^2}{x^2} = 1 \to 1$

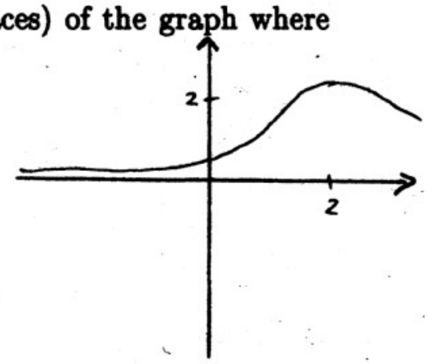
As $(x,y)\to(0,0)$ along y-axis $\frac{x^2}{x^2+y^2} = \frac{0}{y^2} = 0 \to 0$

Since $1 \neq 0$, this limit D.N.E.

2. A contour plot for a function $z = f(x,y)$ is shown. On the axes provided, draw plots of the cross-sections (or traces) of the graph where $x = 0$ and where $y = 0$.



x=0:



y=0: