# MATH 249

## Today

1. 14.2 Limits (Understand the notion of a limit for a multivariable function and the major differences from single-variable limits.)

2. WeBWorK

3. Homefun/Python

# 14.2 Limits of Multivariable Functions

1. Let $f$ be a function of 2 variables whose domain $D$ includes points arbitrarily close to $(a, b)$. We say $\lim\limits_{(x,y)\to(a,b)} f(x, y) = L$ provided that for every $\epsilon > 0$ (an "error tolerance"), there is a corresponding $\delta > 0$ such that whenever $0 < \sqrt{(x-a)^2 + (y-b)^2} < \delta$ we get $|f(x, y) - L| < \epsilon$.

   [Also see Maple for various angles.]

2. We get all of the usual limit laws except for L'Hôpital's Rule .

3. For the limit to exist, the limit value along **every** path to $(a, b)$ must be the same.

4. $f$ is continuous at $(a, b)$ if $\lim\limits_{(x,y)\to(a,b)} f(x, y) = f(a, b)$. It is continuous **on** $D$ if it is continuous at every point of $D$.

5. The same principles apply for three or more variables.

6. Examples p. 877: #7, 9, 18, 14, 37

# Next Time

1. Watch 14.3 [$\sim$ 53 minutes]