Let $f : X \to Y$ be a function taking points in X to points in Y. In Calc I, X and Y were usually both $\mathbb{R}$. Now we allow X to be $\mathbb{R}^2$ or $\mathbb{R}^3$.

Recall the idea of a function having a limit at a point $x_0 \in X$. Intuitively, this means there is some value L such that when x gets closer to x_0, $f(x)$ gets closer to this value L.