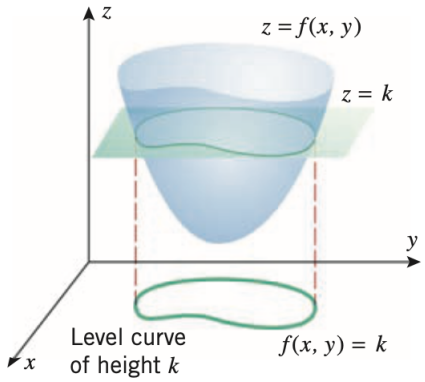
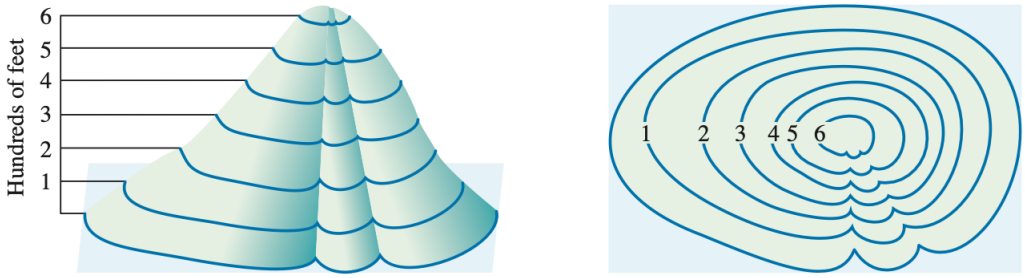
Level Curves: The level curves of a function f of two variables are the curves $f(x, y) = k$ where k is a constant in the range of f.

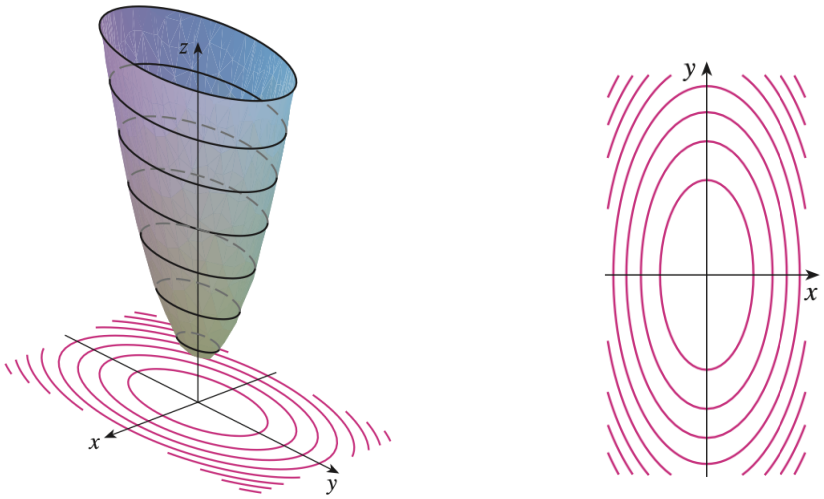


We form a **contour plot** (or contour map) by drawing several level curves in the xy-plane and labeling them with their z-value or height. The level curves should be evenly spaced to give the best visual representation. (This is how topographical maps are drawn.)

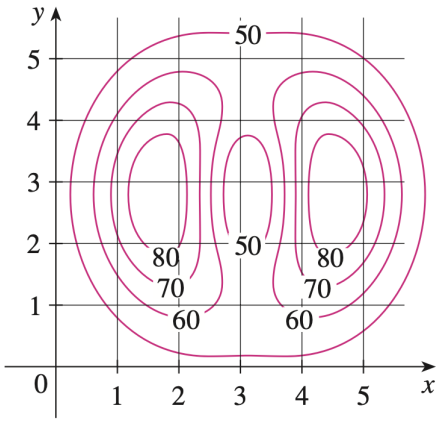
Example 1: A hill and its contour plot



Example 2: $f(x, y) = 4x^2 + y^2 + 1$



1. Use the contour plot for $f(x, y)$ to estimate $f(2, 2)$ and $f(4, 5)$.



2. Sketch the contour plot of $f(x, y) = 2 - x - y$ using the level curves at height $k = 0, \pm 2, \pm 4$.

3. Sketch the contour plot of $z = xy$.