

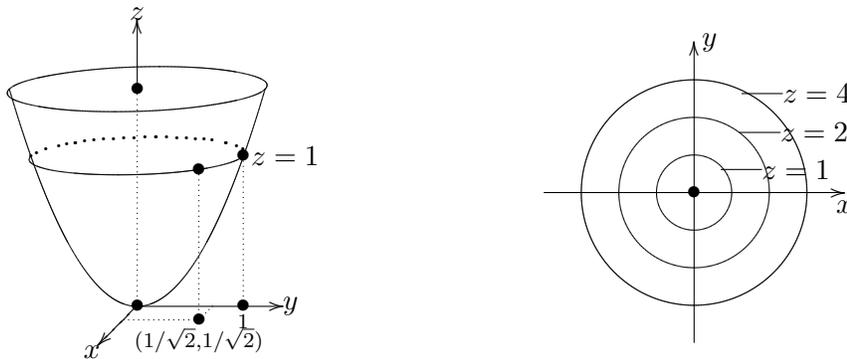
Level Curves and Contour Plots

Level curves and *contour plots* are another way of visualizing functions of two variables. If you have seen a topographic map then you have seen a contour plot.

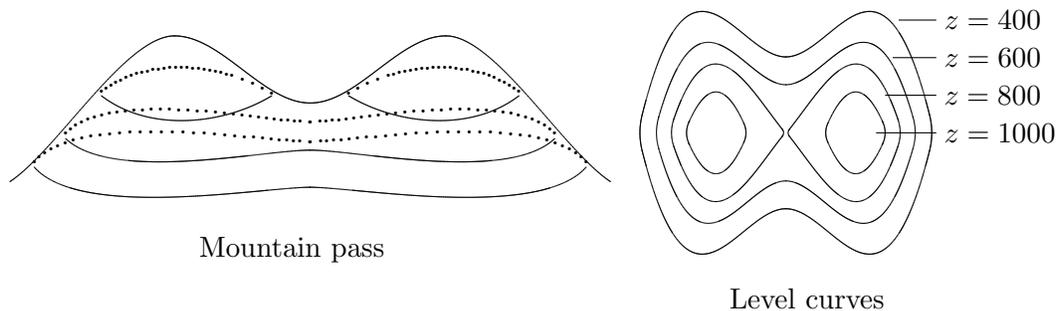
Example: To illustrate this we first draw the graph of $z = x^2 + y^2$. On this graph we draw *contours*, which are curves at a fixed height $z = \text{constant}$.

For example the curve at height $z = 1$ is the circle $x^2 + y^2 = 1$. On the graph we have to draw this at the correct height. Another way to show this is to draw the curves in the xy -plane and label them with their z -value. We call these curves *level curves* and the entire plot is called a *contour plot*.

For this example they are shown in the plot on the right. Notice that the 3D graph is simply the level curves 'pulled out' each to its correct height.



Here is another plot of a 'mountain pass'. Notice that in the contour plot the mountain pass is represented by a level curve that crosses itself. Moving up or down from the cross level curves heights decrease and moving right or left in the other they increase.



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