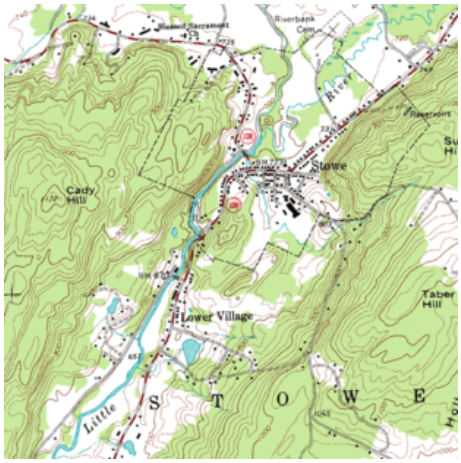
MTH243

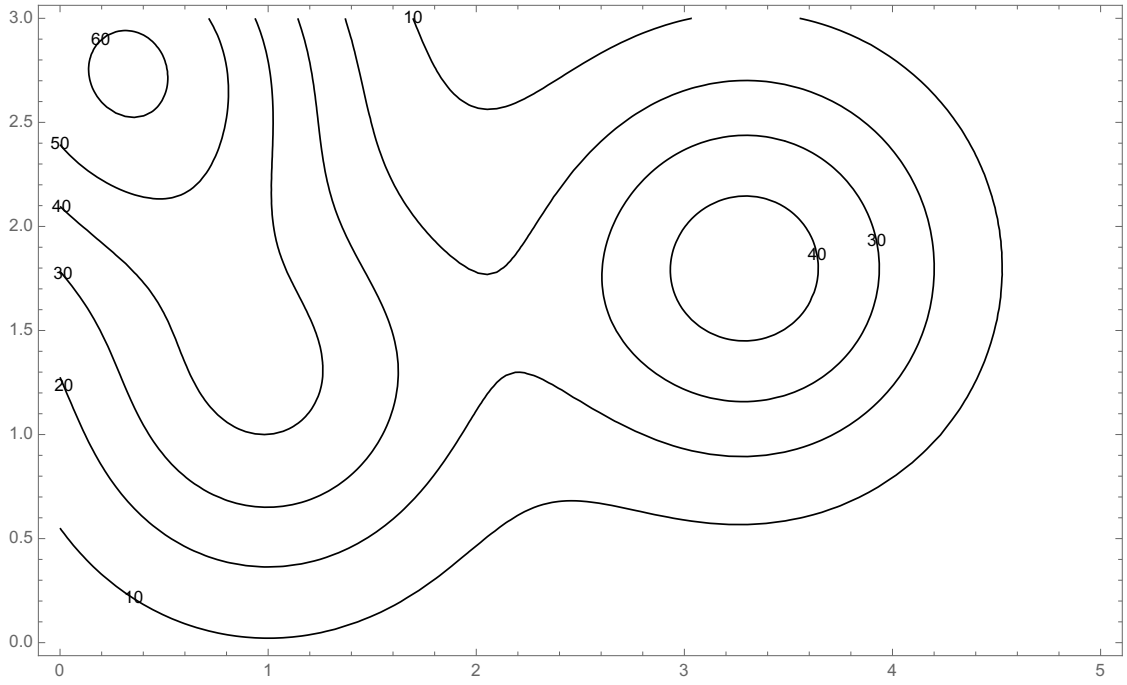
CONTOURS

One of our original examples of a function of two variables used isotherms. Isotherms are curves where the temperature is constant – all points on the line have the same temperature. Similarly, on a geographical map, the contours represent points at the same height.

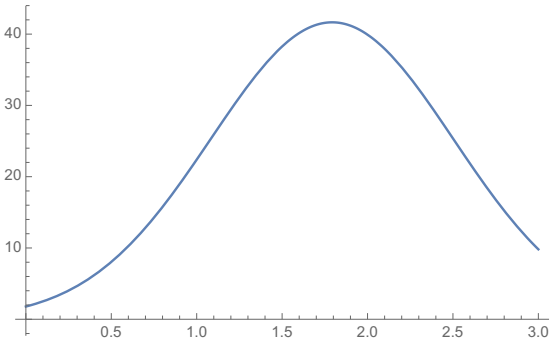


Reading Contour Plots and Graphs

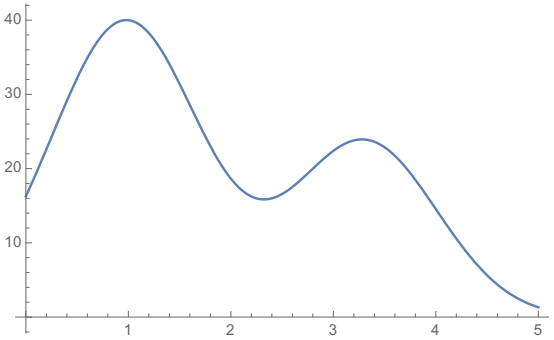
Example 1. Consider the picture below. Use the contour plot to estimate $f(3,2)$ and $f(1,1)$. Then draw the cross sections for $x = 3$ and $y = 1$.



It seems that good estimates are $f(3,2) \approx 38$ and $f(1,1) \approx 40$. The graph of the cross-section $x = 3$ is



and for $y = 1$ it is



We can also use contour diagrams to sketch the graph of the function, thus connecting our two ways of visualising functions.

- To get the contour diagram from the graph is easy. Just connect up all the points of the same height on the surface and then project onto the xy-plane. (Contours are just cross-sections with z-fixed).
- To get the graph from the contour plot, we note that each contour represents a set of points taking the same value under f. So we take each contour and raise it to a height equal to the value the function takes on the contour.