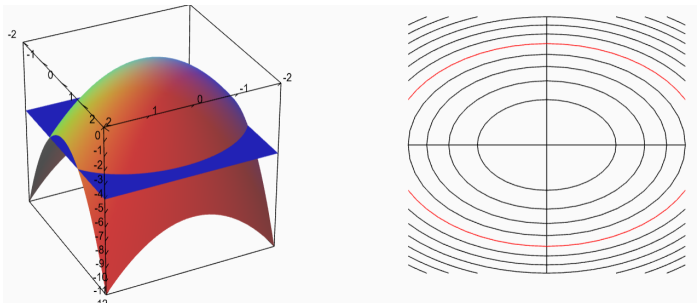
12.2 Functions of several variables: $z = f(x_1, ..., x_n)$

Level set: $f(x_1, ..., x_n) = c$ for some constant c.



Nykamp DQ, Level sets. From Math Insight. http://mathinsight.org/level_sets

A topographical map shows level sets:

https://sciencing.com/read-topographic-maps-4577366.html

Can use level sets to understand graphs of functions with 3 variables:

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

Example: $g(x, y, x) = x^2 + y^2 + z^2 - 8z$

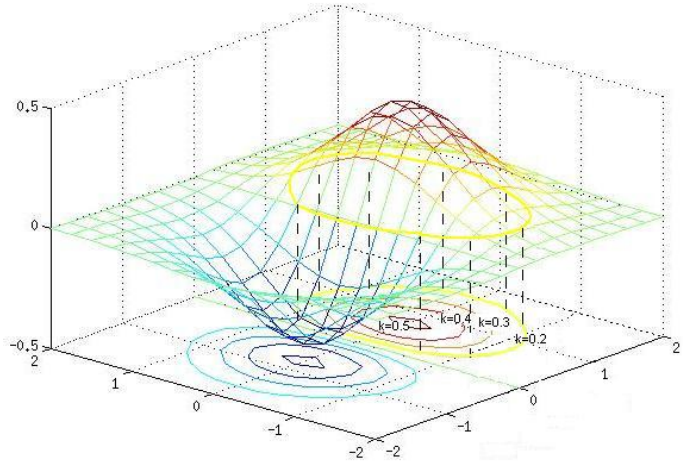
Cross section = the intersection of the graph of $z = f(x, y)$ with a plane.

Examples:

$z = f(c, y)$

$z = f(x, c)$

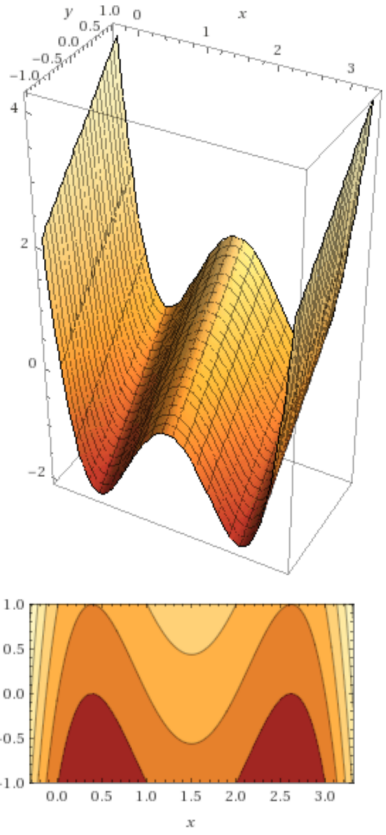
$c = f(x, y)$



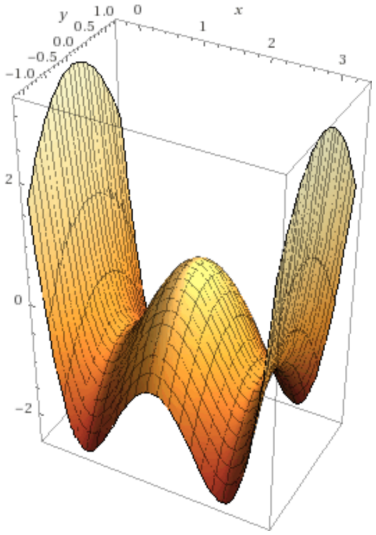
https://www.math.tamu.edu/~mpilant/math696/m696_240/jsamayoa/public_html/levelcurves.html

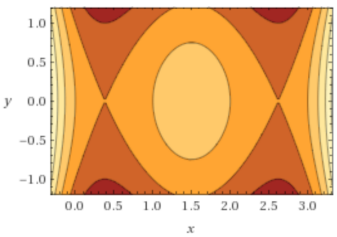
Match the following graphs to one of the functions below:

1.)



2.)





https://www.wolframalpha.com/

a.) $f(x, y) = 6x^3 + 11x^2 - 6x + y$

b.) $f(x, y) = x^4 - 6x^3 + 11x^2 - 6x + y$

c.) $f(x, y) = x^4 - 6x^3 + 11x^2 - 6x - y^2$

d.) $f(x, y) = x^4 - 6x^3 + 11x^2 - 6x + y^2$