11.8 Lagrange Multipliers

The Setup

We are trying to maximize or minimize a function subject to some constraints

The Idea

The formula

Example 1

We are trying to find the dimensions of a box with no lid that is made of 12 cm^2 of cardboard that has maximum volume.

Example 2

Find the maximum and minimum values of the function $f(x,y) = 4x + 6y$ on the circle $x^2 + y^2 = 13$

Example 3

Find the maximum and minimum values of the function $f(x,y) = x^2y^2z^2$ on the sphere $x^2 + y^2 + z^2 = 1$

Example 4

Find the maximum and minimum values of $f(x, y, z) = x + y + z$ on the intersection of $x^2 - y^2 = z$ and $x^2 + y^2 = 4$.

11.8 # 3, 5, 9, 19, 29, 39