MATH 134A+105A+110A Review: Lagrange Multiplier Method

Facts to Know

To find the absolute/global maximum and minimum values of $f(x, y)$ subject to the constraint $g(x, y) = k$

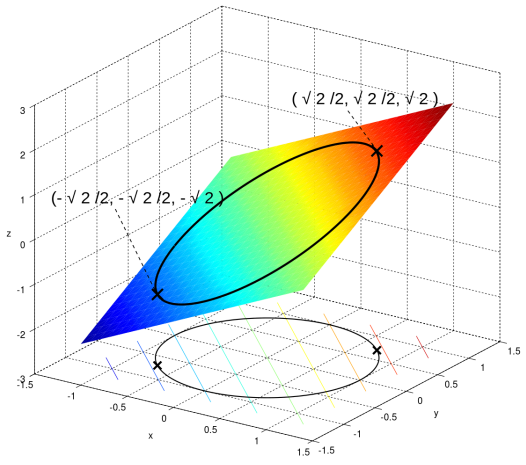
(a) Find all values of x, y, λ such that

$$\begin{cases} \nabla f(x, y) = \lambda \nabla g(x, y) \\ g(x, y) = k \end{cases}$$

(b) Evaluate f at all the points (x, y) that result from the previous step. The largest of these values is the maximum value of f; the smallest is the minimum value of f.

Examples

1. Maximize $f(x, y) = x + y$ subject to the constraint $x^2 + y^2 = 1$.



2. Maximize $f(x, y) = x^2 y$ subject to the constraint $x^2 + y^2 - 3 = 0$.