Math 103X: Honors Vector Calculus

Solving Max/Min Problems: Introduction and Overview

The Goal:
Find the highest/lowest values of a function, called *the objective function*, in a specified *domain* for the variables. The answers are called the *global maximum* and the *global minimum*.

The Approach:
Find all possible points in the domain where the maxima/minima of the objective function can occur.

The Steps:

0) Sketches help. The objective function may be too complicated to draw, but sketches of the domain are very useful (especially for step II).

I) **Inside the domain**
Inside the domain, max/min can occur only at **critical points** where **all 1^{st} derivatives $= 0$.**
Use the **2^{nd} derivative test** to determine if a critical point is a local max, a local min, or an inflection point.

II) **On the edges of the domain**
On the boundary of the domain, check for other possible values that might give maxima or minima.

III) **Compare**
Compare all of the $f(x)$ values from (I, II) and pick out the highest and lowest for the max/min.