

Announcements

- 1) Exam 2: Thursday next week, covering 14.1-14.6, 13.3 (curvature), practice problems on Canvas under "Assignments".
- 2) Extra Credit: last week's in-class worksheet, problem #4, due Tuesday after exam

Some Clean-up

Clairaut's Theorem: (Equality of mixed Partial) Let f be a function of two variables,

If $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$ exist in a

disk of nonzero radius about

(a, b) and the partials are continuous,

then

$$\frac{\partial^2 f}{\partial y \partial x}(a, b) = \frac{\partial^2 f}{\partial x \partial y}(a, b)$$

Notation for Partial Derivatives

$$\frac{\partial f}{\partial x} = f_x, \quad \frac{\partial f}{\partial y} = f_y$$

Second Order

$$\frac{\partial^2 f}{\partial x^2} = f_{xx}, \quad \frac{\partial^2 f}{\partial y^2} = f_{yy}$$

$$\frac{\partial^2 f}{\partial x \partial y} = f_{yx}, \quad \frac{\partial^2 f}{\partial y \partial x} = f_{xy}$$

Optimization

(Section 14.7 **Not on Exam 2**)

Recall: (local maxima and minima
for Calc I)

You take derivatives of a
function, find all points
where the derivative is
zero or does not exist.

These are called **critical points**.

Local maxima and minima
occur (sometimes) at these points.

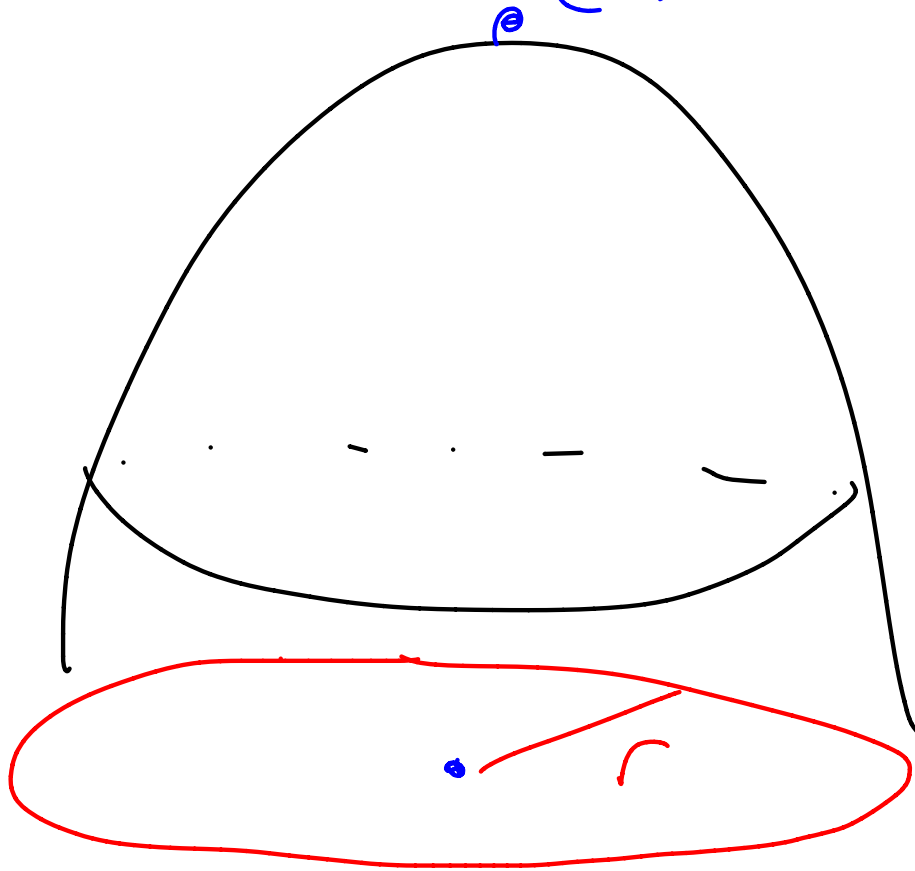
Local Maxima and Minima for Functions of Two Variables

If f is a function of 2 variables, f has a local maximum at $x=(a,b)$ if there is a disk of radius r about (a,b) such that

$f(a,b) > f(x,y)$ for
all $(x,y) \neq (a,b)$ in the disk.

Picture

$(a, b, f(a, b))$



$(a, b, 0)$