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

Clairault's Theorem: (Equality of mixed Partials) 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

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

Notation for Partial Derivatives

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

Second Order

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

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

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

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

Picture