11. 27. 22

LECTURE 45

relative extremum = either relative max or min @ (x_0, y_0)
absolute extremum = either absolute max or min @ (x_0, y_0)

THEOREM (extreme-value theorem): If f is defined on a closed and bounded region and it's continuous, it has both absolute extremums.

closed means that it includes all of its boundary pts.

interior relative extremum = rel. extreme @ (x_0, y_0) + its in interior of dom(f)
boundary relative extremum = rel. extreme @ (x_0, y_0) + in boundary of (x_0, y_0)

THEOREM If f has a relative extremum @ (x_0, y_0) and f_x and f_y both exist at (x_0, y_0) then:

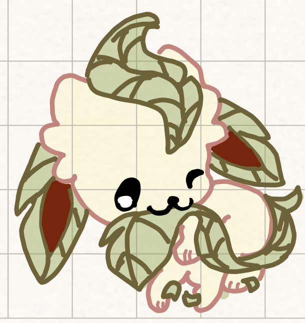
$$\nabla f(x_0, y_0) = 0$$

This point is considered a critical point. Critical points also occur when one or more of the first partials DNE

THEOREM Every relative extremum occur at 1) boundary point of f or 2) critical point of f

Note: not every critical point has a relative extremum

↳ points that are critical but no extremum are called saddle points



Lecture 45 Problems

1) B, since C it may not be continuous

LECTURE

2) A 3) D, closed and bounded