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☆ Course / Unit 3: Optimization / Lecture 9: Second derivative test



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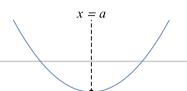
In the last lecture we saw a graphical way to classify critical points of a function $f\left(x,y
ight)$ using the gradient field. However, we do not always have access to the gradient field, so we need a way to classify critical points algebraically. In single variable calculus, we used the second derivative test.

Suppose that x=a is a critical point of f(x), with f'(a)=0.

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f(a)>0, then $f\left(x
ight)$ has a local minimum at x=a .



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About f''(a) < 0, then f(x) has a local maximum at x = a.

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News If f''(a)=0, or does not exist, then the test is inconclusive — there might be a local maximum, or a local minimum, or neither.

Legaecond derivative of f(x) tells us something about the curvature of the function. This leads us to two

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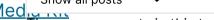
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