You are taking "Exam (Timed, No Correctness Feedback)" as a timed exam. Show more

End My Exam 44:02:49

Previous Next

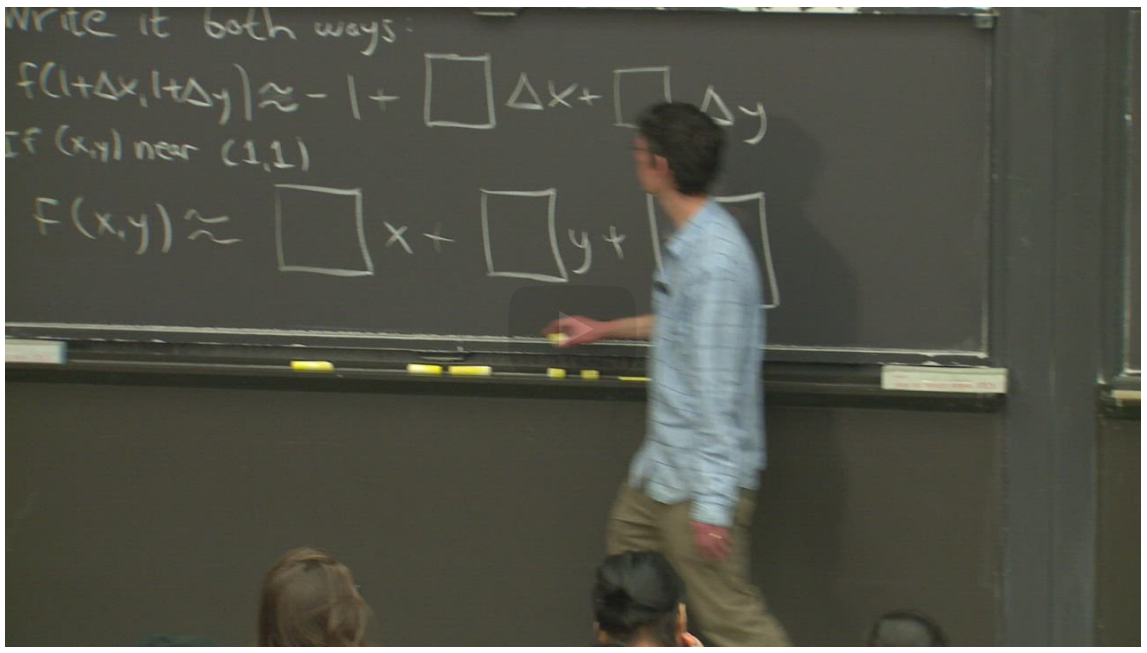
3. The geometry of linear approximation

Bookmark this page

Lecture due Aug 18, 2021 20:30 IST Completed

Review

Review of linear approximation



0:00 / 0:00 2.0x

Start of transcript. Skip to the end.

PROFESSOR: Let's start to talk it through together.

If you want to, you can keep working until I get down to here or so.

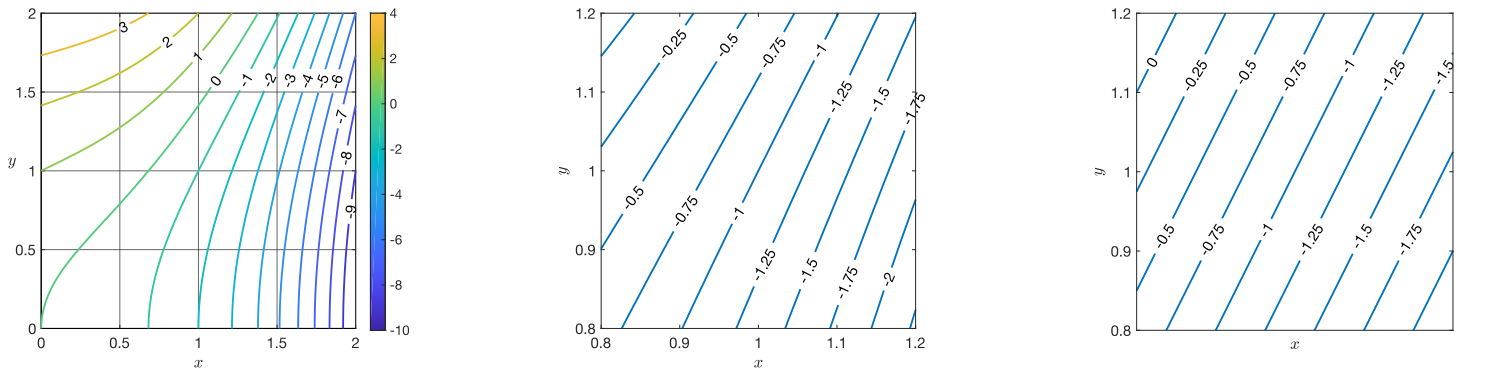
So we take the x derivative of this-- that.

And if we plug in x equals 1-- if you plug in 1 and 1

Video
Download video file

Transcripts
Download SubRip (.srt) file
Download Text (.txt) file

Consider the following figures.



Left: Level curves of $f(x,y) = y^2 - x^3 - x$.
Center: Level curves of $f(x,y) = y^2 - x^3 - x$ zoomed in near $(1,1)$.
Right: Level curves of the tangent plane $z = -4x + 2y + 1$.

On the left, we have the level curves of $f(x,y) = y^2 - x^3 - x$. In the center, we have those same level curves but zoomed in near $(1,1)$. On the right, we have the level curves of the tangent plane at $(1,1)$ given by $z = -4x + 2y + 1$.

You can see that the level curves in the center are similar to the parallel lines on the right. When we zoom in on the function $f(x,y)$, its level curves look more and more like the level curves of the tangent plane.

Find a normal vector

1.0/1 point (graded)
Find a normal vector to level curves of f at $(1,1)$.

Calculator Hide Notes

(Enter as a vector between square brackets. For example, enter the vector $\langle a, b \rangle$ as `[a,b]`.)

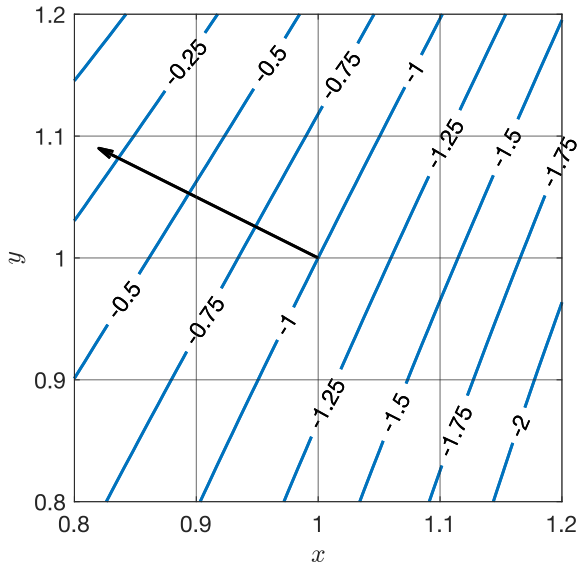
[-4,2] ✔ **Answer:** [-4,2]

Solution:

One idea is to find the normal vector to the level lines of $z = -4x + 2y + 1$. We saw how to do this last lecture. Let's take the level curve at height -1 since this is the value of $f\,(1, 1)$. So the level curve we have is

$$-4x + 2y + 1 = -1$$

and the normal vector is $(-4, 2)$. Let's look at a picture of this. I've re-scaled the vector so it fits on the axes shown.



A scaled vector pointing in the direction (-4,2) is perpendicular to the level curve of f at the point (1,1).

Submit You have used 1 of 7 attempts

Answers are displayed within the problem

3. The geometry of linear approximation

Hide Discussion

Previous Next

Calculator Hide Notes

edX

About
Affiliates
edX for Business
Open edX
Careers
News

Legal

Terms of Service & Honor Code
Privacy Policy
Accessibility Policy
Trademark Policy
Sitemap

Connect

Blog
Contact Us
Help Center
Media Kit
Donate

Calculator Hide Notes