Daily Prep Assignment for March 2nd

Overview

In Section 10.3 we will investigate what happens when you take repeated partial derivatives of a function. In particular we are interested in the geometric interpretations of these second derivatives. In section 10.4 we examine what it means for a function to be locally linear and what differential means. Being differentiable and having a unique tangent line were closely tied in single variable calculus. In higher dimensions we will see that having a unique tangent plane is the key to differentability at a point. We will then examine how to compute tangent planes and use them to approximate change in a functions inputs.

Basic learning objectives

These are the tasks you should be able to perform with reasonable fluency **when you arrive at our next class meeting**. Important new vocabulary words are indicated *in italics*.

- Understand that the second derivative of single variable functions tells us about concavity.
- Know the equation for the tangent plane of a function $f(x, y)$ at a point (x_0, y_0) is given by

$$z = f(x_0, y_0) + f_x(x_0, y_0)(x - x_0) + f_y(x_0, y_0)(y - y_0).$$

Advanced learning objectives

In addition to mastering the basic objectives, here are the tasks you should be able to perform **after class, with practice**.

- Interpret the second partials of a function in context.
- Understand what locally linear means for a function to two variables.
- Know the definition of differentiable for a function fo several variables.
- Compute the tangent plane to a function of several variable and interpret it in context.
- Use differentials to approximate change in a function.

To prepare for class

Preview activities: Read the example preview activity solution on the course website then,

- Preview activity 10.3.1
- Preview activity 10.4.1

Reading:

- Read section 10.3
- Read section 10.4

Watching: Watch these additional resources if you need support reading the text.

1. Overview of 10.3: `https://youtu.be/nFig9hbQZ3U`
2. Overview of 10.4: `https://youtu.be/8YBxKp5RN7M`

During and after class

- Activity 10.3.2
- Activity 10.3.3
- Activity 10.3.4
- Activity 10.4.2
- Activity 10.4.3
- Activity 10.4.4