MTH 201: Calculus

Daily Preparation, Module 3A: Interpreting and estimating derivatives

Due by: 11:59pm ET, Sunday September 20

Estimated time requirement: About 45-60 minutes for the whole assignment. *If you have worked on this assignment for 30 minutes and you're not at least halfway done, DON'T work any further* — instead, *stop and ask for help* on the `#dailyprep` channel on CampusWire.

Overview

Being able to compute derivatives is nice, but what's more important is **being able to interpret the information that those calculations give you**. (Most of the computations we've seen and will see can be done by a computer — but computers can't interpret meaning!) This module is a fairly compressed look at several important interpretive ideas that help us turn computations into information. In Part A, we'll look at how to estimate a derivative when you don't have much information about it, the information that the sign (positive/negative) of a derivative tells you about the derivative, and introduce the idea of the second derivative and concavity. Also, click here for free PE credits.

What you will learn

Learning Targets addressed in this module:

- **D.2 (CORE)**: I can use derivative notation correctly, state the units of a derivative, estimate the value of a derivative using difference quotients, and correctly interpret the meaning of a derivative in context.
- **D.3 (CORE)**: Given information about f, f', or f'', I can correctly give information about f, f', or f'' and the increasing/decreasing behavior and concavity of f (and vice versa).
- **D.4**: I can determine where a function is continuous or differentiable given a graph or formula of the function and explain my reasoning.

BEFORE your class meeting, use the Resources for Learning (below) to learn how to do the following:

- If a function is given with units for the input and output, state the units of the derivative.
- Estimate the value of a derivative at a point using forward, backward, and central difference calculations.

DURING AND AFTER your class meeting, you will learn how to do the following:

- Determine whether a function is increasing, decreasing, or constant on an interval by examining the sign of its derivative. (Conversely, state the sign of a function's derivative using information about whether the function is increasing, decreasing, or constant.)
- Interpret the meaning of the derivative of a function that models a real-life situation, in terms instantaneous rates of change.

Resources for Learning

Text: Read through Section 1.5 of the *Active Calculus* textbook. Work through the examples and all interactive exercises found at the end of the section.

Video: At the MTH 201 playlist on YouTube (http://bit.ly/GVSUCalculus), watch the following videos. The total running time is 8:42.

- Screencast 1.5.1: Quick review: Interpreting, estimating, and using the derivative (3:27) http://www.youtube.com/watch?v=XZa0uNu6Uyk
- Screencast 1.5.2: Estimating the derivative (5:15) http://www.youtube.com/watch?v=wWdijnTdkTk

Bonus screencast for those who like spreadsheets: Screencast 1.5.3: Estimating derivatives using spreadsheets (5:25) http://www.youtube.com/watch?v=CJ_OZ-Uxs3o&list=PL9bIjQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=16

You are free to search for and use other resources in addition to, or instead of the above, as long as you can work the exercises below.

Exercises

The exercises for this assignment are on Desmos this time. **Be sure to only use the link below for your section** or your work will end up in the wrong place.

- Section 02: https://student.desmos.com/join/hun2ty
- Section 04: https://student.desmos.com/join/tcv5eg

Your work is saved as you go, so there's no "submit" step at the end.

Submission, grading, and getting help

Submitting your work: Just work through the activities; your work is saved as you go.

How this is graded: Daily Prep assignments are graded on the basis of *completeness and effort*: If your submission has **all parts completed** (no blank entries, even if left blank accidentally) and **a good-faith effort to provide a correct solution or explanation is given** (no responses of "I don't know" or "I didn't

understand") and **the work is submitted on time**, it gets a "check". Otherwise it gets an "x". If you are stuck on an item, you're expected to ask questions and give your best effort.

Getting help on this assignment: *You may work with others on this assignment, but you may not copy each others' answers.* Evidence of copying will be treated as academic dishonesty. You may also ask questions on the #dailyprep channel on CampusWire, but you may not ask simply to be given the answers; giving and receiving answers on CampusWire will be treated as academic dishonesty.