MTH 201: Calculus

Daily Preparation, Module 1B: The notion of the limit

Due by: 11:59pm ET, Tuesday September 8

Estimated time requirement: About 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

In the previous lesson, we introduced an idea that is central to calculus: Rather than just plugging a number into a function or process and finding the output, we look at a *sequence* of inputs and estimate what the outputs should *eventually* become as the sequence closes in on a particular number. In this lesson we're going to formalize this idea through the concept of the **limit**. A limit is a process that we apply to an existing function where we let the input to the function get closer and closer to – but not become exactly equal to – a certain input and observe what the outputs do. This process is central for computing instantaneous velocities, and it will lead us to the main concepts of calculus. For now, we will define the concept of the limit and calculate limits using graphical and numerical methods.

What you will learn

Learning Targets addressed in this module:

> L.1: **(CORE)** I can find the limit of a function at a point using numerical, graphical, and algebraic methods.

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

- Find the limit of a function as the input approaches a point, using tables and graphs.
- Explain the notation used for limits.

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

- Find the limit of a function as the input approaches a point, using algebraic simplification.
- Find the instantanous velocity of a moving object by setting up and computing a limit.

Resources for Learning

Video: At the MTH 201 playlist on YouTube (http://bit.ly/GVSUCalculus), watch the following videos. The total running time is 18:27.

- Screencast 1.2.1: Limits (6:02) https://www.youtube.com/watch?v=GZzJOAUOqLI
- Screencast 1.2.2: Limits of functions using graphing tools (6:27) https://www.youtube.com/watch?v=5TFu_sh_orM
- Screencast 1.2.3: Limits of functions using tables (5:58) https://www.youtube.com/watch?v=GdBliRzaTAQ

And here is an optional fourth video that may help you with the other concepts:

- Screencast 1.2.4: Limits of functions using spreadsheets (5:38) https://www.youtube.com/watch?v=uAepmkpG34A

Text: Read through Section 1.2 of the *Active Calculus* textbook: https://activecalculus.org/single/sec-1-2-lim.html

Work through the examples and all interactive exercises found at the end of the section.

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.

Recommendation: Watch all the videos, then skim the text and try a couple of the exercises at the end. Don't spend more than 45 minutes in a combination of videos and text.

Exercises

The exercises for this Daily Prep are all done on Desmos. Please go to student.desmos.com and enter in the code for your section:

- Section 02 (F2F meetings 10:00-10:50am): `5FK PJV`
- Section 04 (F2F meetings 3:00-3:50pm): `CDK 5XG`

Be sure you enter the correct code for your section, or your work won't be saved properly.

Submission, grading, and getting help

Unlike Google Forms, with Desmos activities there is no button to press to submit your work. Just do all the items in the activity, and your work will be saved as you go. If you need to change anything before the deadline, just log back in with the code for your section and make your changes.

This assignment is not supposed to take more than an hour and you may find it takes a lot less time than that. *If you have been working purposefully for 30 minutes and are still struggling to understand the basics of what's happening, don't keep working at it — stop, and ask for help.* You can work with a friend, or ask a

question on the `#dailyprep` channel on CampusWire.

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 #guidedpractice 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.