

MTH 201: Calculus

Daily Preparation, Module 2A: The derivative of a function

Due by: 11:59pm ET, Sunday September 13

Estimated time requirement: No more than 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 this section we make first contact with the most central concept in the course: The notion of **the derivative of a function**. The derivative of a function at a point is essentially the same thing as the instantaneous velocity of an object at a single point in time, but the derivative is more general and encompasses a much wider range of applications than just motion. In the section, we define the derivative of a function at a point in terms of average rates of change and limits; introduce the “prime” notation for the derivative; discuss the units of measurement for the derivative; and connect the derivative to the geometric concept of a tangent line and especially its slope.

What you will learn

Learning Targets addressed in this module:

- D.1 (**CORE**): I can find the derivative of a function, both at a point and as a function, using the definition of the derivative.
- 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.

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

- State the formal definition of the derivative of a function.
- Explain the meaning of the various parts of the definition of the derivative.
- State the units of a derivative.
- Interpret the meaning of a derivative in terms of instantaneous velocity and the slopes of tangent and secant lines.

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

- Compute the derivative of a function at a point by setting up and evaluating the limit in its definition.
- Apply the derivative to questions about rates of change and tangent lines.

Resources for Learning

Text: Read through Section 1.3 of the *Active Calculus* textbook: <https://activecalculus.org/single/sec-1-3-derivative-pt.html> 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 17:18.

- Screencast 1.3.1: Quick review – The derivative of a function at a point (2:22) <https://www.youtube.com/watch?v=0zpQnwVaU28>
- Screencast 1.3.2: The derivative of a function at a point (9:12) <https://www.youtube.com/watch?v=fQ5yeIPpFk0>
- Screencast 1.3.3: Derivative of a function at a point using graphs (5:44) <https://www.youtube.com/watch?v=0DJPSYeLFpc>

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 all in a Desmos activity this time. Click on the link below that corresponds to your section. **Be sure to only use the link for your section** or your work will end up in the wrong place.

- Section 02: <https://student.desmos.com/join/m92nwk>
- Section 04: <https://student.desmos.com/join/kq268s>

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.