MTH 201: Calculus

Daily Preparation, Module 7A: Finding maximum and minimum values of a function

Due by: 11:59pm ET, Sunday, October 18

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

In Module 7, we start a deep dive into *applications of the derivative*. The first application is one that we've seen before — finding peaks and troughs on the graph of a function. We can estimate these visually if we can see them; but since estimation is error-prone, we'd like a way to pinpoint the exact location of places where a function reaches a peak or a trough, and find *all* such locations, not just the ones that we see. We'll introduce the concept of the **critical number** of a function to help us, and then the **First** and **Second Derivative Tests** as tools for finding them. Also: If you're reading this overview, [click here for an Easter egg](#).

What you will learn

Learning Targets addressed in this module:

- **DA.1 (CORE)**: I can find the critical values of a function, determine where the function is increasing and decreasing, and apply the First and Second Derivative Tests to classify the critical points as local extrema.
- **DA.2**: I can determine the intervals of concavity of a function and find all of its points of inflection.

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

- Identify the global and local minimum and maximum values of a function, given the function's graph.
- State the definition of *critical number* and identify all the critical numbers of a function given the function's graph.
- State the First Derivative Test.

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

- Find all the critical numbers of a function algebraically using derivatives.
- Use the First Derivative Test to determine whether a critical number of a function is a relative

minimum, relative maximum, or neither.

Resources for Learning

Text: In the *Active Calculus* text, read in [Section 3.1](#) only up to, but *not* including Example 3.1.10. (Module 7B will start with Example 3.1.10.)

Video: Watch the following from the GVSUMath Calculus playlist. This is about 30 minutes of video altogether.

- Screencast 3.1.1: Quick review – Extreme values of functions (4:11) https://www.youtube.com/watch?v=Bzj_oXB6yIU&list=PL9bIjQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=55
- Screencast 3.1.2: Finding local and global extrema (5:06) https://www.youtube.com/watch?v=tvF3Rq0urvI&list=PL9bIjQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=56
- Screencast 3.1.3: Identifying critical values graphically (4:21) https://www.youtube.com/watch?v=7RcLQZdB0LM&list=PL9bIjQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=57
- Screencast 3.1.4: Finding critical values (3:12) https://www.youtube.com/watch?v=x-efI3Br11E&list=PL9bIjQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=58&t=24s
- Screencast 3.1.5: Using the First Derivative Test (11:09) https://www.youtube.com/watch?v=9rg5jpFVSFY&list=PL9bIjQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=59

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 are on Desmos Activities. Go to student.desmos.com and look for *Module 7A Daily Prep*.

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.