MTH 201: Calculus

Daily Preparation, Module 11B: The Fundamental Theorem of Calculus – First look

Due by: 11:59pm ET, Sunday, November 22

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

We've spent the entire course studying one of two things: *derivatives* which tell us rates of change, and *integrals* which tell us total change. In Module 11B, and continuing into Module 12, our last concept of the course is a major mathematical fact that ties these two ideas together. It's called the **Fundamental Theorem of Calculus** (FTC). The FTC unifies the integral and the derivative, and as a by-product it gives a way to compute definite integrals without geometry and without approximation.

What you will learn

Learning Targets addressed in this module:

- **INT.4 (CORE)**: I can evaluate a definite integral using the Fundamental Theorem of Calculus.
- **INT.5**: I can correctly antidifferentiate basic functions and identify antiderivatives.

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

- State the Fundamental Theorem of Calculus.
- Find the most general antiderivative of a function.
- Use the Fundamental Theorem of Calculus to find the exact value of a definite integral using an antiderivative.

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

- Use the Fundamental Theorem of Calculus to find the exact value of a definite integral using an antiderivative (for more complex functions).

Resources for Learning

I recommend watching the videos first for this Module.

Video: Watch these at the GVSUMath YouTube playlist:

- Screencast 4.4.1 – Quick review: The Fundamental Theorem of Calculus (3:15) https://www.youtube.com/watch?v=bwjUioJyWe8&list=PL9bljQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=88
- Screencast 4.4.2 – Fundamental Theorem of Calculus with power functions (7:33) https://www.youtube.com/watch?v=1uxPq8Gtm18&list=PL9bljQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=89
- Screencast 4.4.3 – Fundamental Theorem of Calculus with exponential functions (7:57) https://www.youtube.com/watch?v=SafcRvQKe4g&list=PL9bljQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=90

Text: In the *Active Calculus* text, read Section 4.4 up to but not including subsection 4.4.3 ("The total change theorem") and then stop. (Module 12 will pick up with the total change theorem.)

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

This is on Desmos this time. Go to student.desmos.com and it should appear in your list.

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.