MTH 201: Calculus

Daily Preparation, Module 6B: Derivatives of inverse functions

Due by: 11:59pm ET, Tuesday, October 13

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

Module 6B introduces the last of our rules for differentiation. We'll apply the Chain Rule to find derivative formulas for **inverse functions** that are the "opposites" of other functions. Especially we will focus on the derivative of $y = \ln(x)$ and *inverse trigonometric functions* like $\arctan(x)$ and $\arcsin(x)$.

What you will learn

Learning Targets addressed in this module:

- **DC.2 (CORE)**: I can compute derivatives correctly for products, quotients, and composites of functions.
- **DC.3**: I can compute derivatives correctly using multiple rules in combination.
- **DC.4**: I can compute the derivatives correctly for logarithmic, trigonometric, and inverse trigonometric functions.

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

- *(Review)* Explain what is meant by an "inverse function" and the notation f^{-1}.
- *(Review)* State the definitions of the functions $y = \log_b(x)$, $y = \ln(x)$, $y = \arctan(x)$, and $y = \arcsin(x)$ and important properties of these functions.
- State the derivative of the function $y = \ln(x)$.
- State the derivatives of the arcsine and arctangent functions.

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

- Find derivatives of inverse functions including logarithmic and inverse trig functions, in combination with other rules.

Resources for Learning

Module 6B involves a significant amount of review of precalculus concepts, about logarithms and trigonometric functions. If you don't have a strong background with this material, you may need to budget more time for review.

Text: For this module you'll do a little reading from the prequel to MTH 201, a course we call MTH 124, *Functions and Models*, in addition to reading from our text.

- First, read sections 1.7.1 and 1.7.3 from *Active Prelude to Calculus* and try the interactive exercise at the end: https://activecalculus.org/prelude/sec-changing-inverse.html
- After doing this, read sections 2.6.2 and 2.6.3 of *Active Calculus* and try the interactive exercises at the end: https://activecalculus.org/single/sec-2-6-inverse.html

Video: Watch the following from the GVSUMath Calculus playlist:

- Screencast 2.6.1: Quick review - Derivatives of inverse functions (3:25) https://www.youtube.com/watch?v=chdkxtt8XQo&list=PL9bljQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=46
- Screencast 2.6.2: Examples of derivatives with natural logarithm (6:30) https://www.youtube.com/watch?v=jhBhSerqbyU&list=PL9bljQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=47
- Screencast 2.6.3: Derivatives involving $\arcsin(x)$ https://www.youtube.com/watch?v=pEEQNdttZsw&list=PL9bljQJDwfGuXQHuS5Jkmum_CFILoCZX-&index=48

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 Classkick, in "Module 6B 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.