Section 1.4 Daily Prep Assignment

Overview

We have recently learned that we can describe the instantaneous rate of change of a function f at a value a by computing

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h},$$

provided this limit exists. When we can find $f'(a)$, we understand that this value represents the instantaneous rate of change of the function with respect to the input variable, and also the slope of the tangent line to the curve $y = f(x)$ at the point $(a, f(a))$.

By viewing the constant a as a variable in its own right, we will next begin thinking about how $y = f'(x)$ is *itself* a function, indeed a function that is related to – or derived from – the original function f. One of the next big questions is: given a function $y = f(x)$, can we find a graph of or formula for or other information about $f'(x)$?

Basic learning objectives

These are the tasks you should be able to perform with reasonable fluency **when you arrive at our next class meeting**. Important new vocabulary words are indicated *in italics*.

- Use the limit definition of the derivative to compute $f'(a)$ for select values of a for certain basic functions f (e.g., any linear function, any quadratic function).
- State the limit definition of the derivative of a function f at a value x. (This is Definition 1.4 in the text.)
- Understand the interpretations of $f'(a)$ as instantaneous rate of change and slope of an appropriate line.

Advanced learning objectives

In addition to mastering the basic objectives, here are the tasks you should be able to perform **after class, with practice**:

- Understand how the graph of a given function f tells us how to generate the graph of its derivative, f'.
- Understand graphically what it means for a function f to not have a derivative at a given value.
- Use the limit definition of $f'(x)$ to find a formula for $f'(x)$ from a given formula for $f(x)$.

To prepare for class

- Read the beginning of section 1.4 and do Preview activity 1.4.
- Read the the rest of Section 1.4.
- Play around with the two apps mentioned in the text: `http://gvsu.edu/s/5C` and `http://gvsu.edu/s/5D`.

Additionally but optionally

- Watch the overview video.
- Watch the screencasts: screencast playlist

After class

- Finish any in-class activities you might not have finished during class.
- (Optionally) Do the problems on the WeBWorK assignment for this section.
- (Optionally) Complete the challenge problem for this section.