Section 1.5 Daily Prep Assignment

Overview

From early in the course, we have associated the derivative of a function with velocity: indeed, if a given function represents the position of a moving object along an axis, then its derivative measures precisely the instantaneous velocity of the object at a given time. Further, we know that regardless of the function under consideration, the derivative measures not only the slope of the tangent line at a given point, but also the function's instantaneous rate of change with respect to the input variable. But what is the meaning of this instantaneous rate of change in contexts other than velocity? For instance, what if a function measures the size of a population at a given time? or the total revenue being generated by a sales of a product? or the rate at which a car consumes gasoline at a given speed? In what follows, we take a closer look at the meaning of the derivative in applied contexts.

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*.

- Know that the units on the derivative of a function f are "units of f per unit of x".

- As always, be comfortable stating and using the limit definition of the derivative.

- Understand how a *difference quotient* can be used to estimate the value of the derivative of a function.

- Given appropriate data, use a *central difference* to obtain a good estimate of the value of a derivative at a point.

Advanced learning objectives

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

- Interpret the value of $f'(a)$ in a wide range of applied contexts while using the units on f and a appropriately.

- Understand how $f'(a)$ enables us to predict approximate change in f on an interval near a.

To prepare for class

- Read the beginning of section 1.5 and do Preview activity 1.5.

- Read the the rest of Section 1.5.

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.