Section 1.2 Daily Prep Assignment

Overview

We will now begin to investigate the idea of the limit of a function at a given input value. Limits are important in calculus for many reasons, but perhaps most important for how they allow us to formally connect instantaneous velocity to average velocity.

This section covers the following concepts: Definition and notation of limits. Graphical interpretation, table of values, algebraic computation. Indeterminate form of type 0/0.

Basic learning objectives

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

- Be comfortable with two related formulas for the average velocity of an object with position function s: on an interval $[a, b]$ and on the interval $[a, a + h]$.
- Begin to understand what we mean when we write things like "$\lim_{x\to 2} f(x) = -3$."
- Begin to understand how limits are used with computations of average velocity in order to determine instantaneous velocity.
- State the definition of a limit of a function.
- Use the limit notation adequately.
- Provide examples (both graphically and numerically) of functions that do not have a limit at a specific value.
- Estimate the limit of a function at a point on a graph (or determine that it does not exist).
- Estimate the limit of a function at a point using a table of values (or determine that it does not exist).

Advanced learning objectives

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

1. Estimate the limit of a function at a point using the algebraic formula (or determine that it does not exist). This includes indeterminate forms of type 0/0.
2. Compute instantaneous velocities using both formulas.
3. Explain what instantaneous velocity represents graphically on a position graph.
4. Understand how instantaneous velocity is thought of as a limit of average velocities.

To prepare for class

- Read the beginning of section 1.2 of Active Calculus (up until the preview activity).
- Do Preview activity 1.2
- Read the the rest of Section 1.2.
- When you get to Example 1.2.4 stop reading and try to do Example 1.2.4 (a) in Active Calculus (without reading the solution), using the graph of the function: Use Desmos to graph f (you define f by typing $f(x) = (4 - x^2)/(x + 2)$, and you can click and drag points on the graph to see the precise coordinates). Finally, read the solution.

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.