Unit 1 Lesson 0 Lesson Plan: An Overview of Calculus

Purpose

Limits are what make calculus possible. Whether we're trying to find the velocity of an object at an instant, the value of π, or the area of an object with curved boundaries, limits allow us to take the formulas from precalculus and make them dynamic. They give us precision when we couldn't otherwise have a precise answer. In Unit 1, we'll study limits in more detail. In Unit 1 Lesson 0, we'll introduce differential calculus by approximating the instantaneous velocity of a falling object, and we'll introduce integral calculus by approximating π. In both cases, we'll practice some important prerequisites from precalculus.

Lesson Outcomes

By the end of this lesson, you will

- Be able to articulate the relationship between calculus and precalculus, and
- Engage your problem-solving skills in two applications of calculus in important historical problems.

Materials That You'll Need

Before you get started, read the following handouts. Print the active learning activity as well.

- U1 L0 Lesson Notes: An Overview of Calculus
- U1 L0 Active Learning Activity: An Overview of Calculus
- A printable version of this lesson plan.

You'll also need a copy of Steven Strogatz's *Infinite Powers.*

Prerequisite Skills and Concepts

To successfully complete the active learning activity, you'll need to apply

- The formula for the slope of a line,
- Definitions of trigonometric functions from right triangle trigonometry,
- The Law of Cosines, and
- The formula for the perimeter of a regular polygon with n sides.

Steps to Complete the Task

Step 1: Take notes during the first class meeting, and read the lesson notes.

Listen and participate in a class discussion about calculus, approximating pi, and finding instantaneous velocity. Read the lesson notes linked in this lesson plan.

Step 2: Complete the Active Learning Activity.

Try the active learning activities with your classmates. You'll start the problems in the Active Learning Activity handout during class, and finish anything you need to finish at home.

Step 3: Complete the assigned reading.

Read the introduction and chapter 1 of *Infinite Powers*.

Step 4: Answer the conceptual questions and submit your assignment.

Answer the questions at the end of the active learning handout, and submit them by the date discussed in class.

Criteria for Success

You know that you've succeeded in mastering this material if you can

- Describe calculus in your own words, and
- Describe limits in your own words.