

Welcome to Cal I!

- comp.uark.edu/~ashleykw/Cal1Spring2016/cal1spr16.html
Course website. All information is here, including a link to MLP, lecture slides, administrative information, etc. You should have already seen the **syllabus** by now.
- MyLabsPlus (MLP) has the graded homework. Solutions to Quizzes and Drill exercises will be posted there, under “Menu → Course Tools → Document Sharing”.

Wed 20 Jan (cont.)

- Lecture slides are available on the course website. I'll try to have the week's slides posted in advance but the individual lectures might not be posted until right before class. **Don't try to take notes from the slides.** Instead, print out the slides beforehand or else follow along on your tablet/phone/laptop. You should, however, take notes when we do exercises during lecture.
- For old Calculus materials, see the parent page comp.uark.edu/~ashleykw and look for links under "Previous Semesters".

§2.1 The Idea of Limits

Question

How would you define, and then differentiate between, the following pairs of terms?

- instantaneous velocity vs. average velocity?
- tangent line vs. secant line?

(Recall: What is a tangent line and what is a secant line?)

Example

An object is launched into the air. Its position s (in feet) at any time t (in seconds) is given by the equation:

$$s(t) = -4.9t^2 + 30t + 20.$$

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- (a) Compute the average velocity of the object over the following time intervals: $[1, 3]$, $[1, 2]$, $[1, 1.5]$
 - (b) As your interval gets shorter, what do you notice about the average velocities? What do you think would happen if we computed the average velocity of the object over the interval $[1, 1.2]$? $[1, 1.1]$? $[1, 1.05]$?

Example, cont.

An object is launched into the air. Its position s (in feet) at any time t (in seconds) is given by the equation:

$$s(t) = -4.9t^2 + 30t + 20.$$

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- (c) How could you use the average velocities to estimate the instantaneous velocity at $t = 1$?
 - (d) What do the average velocities you computed in 1. represent on the graph of $s(t)$?

Question

What happens to the relationship between **instantaneous** velocity and **average** velocity as the time interval gets shorter?

Answer: The instantaneous velocity at $t = 1$ is the limit of the average velocities as t approaches 1.

Question

What about the relationship between the **secant** lines and the **tangent** lines as the time interval gets shorter?

Answer: The slope of the tangent line at $(1, 45.1 = s(1))$ is the limit of the slopes of the secant lines as t approaches 1.

2.1 Book Problems

1-3, 7-13, 15, 21, 25, 27, 29

Even though book problems aren't turned in, they're a very good way to study for quizzes and tests (wink wink wink).

§2.2 Definition of Limits

Question

- Based on your everyday experiences, how would you define a “limit”?
- Based on your mathematical experiences, how would you define a “limit”?
- How do your definitions above compare or differ?