

- 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”.

Mon 25 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. **Suggestion:** When printing the slides, put more than one slide per page and print double-sided.

Mon 25 Jan (cont.)

- For old Calculus materials, see the parent page comp.uark.edu/~ashleykw and look for links under “Previous Semesters”.
- GET YOUR CLICKER
- Note: There is no Blackboard for this course.
- Stay on top of the MLP! First deadline is coming up. Don't wait till the last minute.
- MLP issues...
- Quiz 1 is due in drill **tomorrow**. See MLP for a copy.

Additional (Algebra) Techniques

When direct substitution (a.k.a. plugging in a) fails try using algebra:

- Factor and see if the denominator cancels out.

Example

$$\lim_{t \rightarrow 2} \frac{3t^2 - 7t + 2}{2 - t}$$

- Look for a common denominator.

Example

$$\lim_{h \rightarrow 0} \frac{\frac{1}{5+h} - \frac{1}{5}}{h}$$

Exercise

Evaluate $\lim_{s \rightarrow 3} \frac{\sqrt{3s + 16} - 5}{s - 3}$.

Another Technique: Squeeze Theorem

This method for evaluating limits uses the relationship of functions with each other.

Theorem (Squeeze Theorem)

Assume $f(x) \leq g(x) \leq h(x)$ for all values of x near a , except possibly at a , and suppose

$$\lim_{x \rightarrow a} f(x) = \lim_{x \rightarrow a} h(x) = L.$$

Then since g is always between f and h for x -values close enough to a , we must have

$$\lim_{x \rightarrow a} g(x) = L.$$

Example

(a) Draw a graph of the inequality

$$-|x| \leq x^2 \ln(x^2) \leq |x|.$$

(b) Compute $\lim_{x \rightarrow 0} x^2 \ln(x^2)$.

2.3 Book Problems

12-30 (every 3rd problem), 33, 39-51 (odds), 55, 57, 61-67 (odds)

In general, review your algebra techniques, since they can save you some headache.

§2.4 Infinite Limits

We have examined a number of laws and methods to evaluate limits.

Question

Consider the following limit:

$$\lim_{x \rightarrow 0} \frac{1}{x}$$

How would you evaluate this limit?

In the next two sections, we examine limit scenarios involving infinity.
The two situations are:

- **Infinite limits:** as x (i.e., the independent variable) approaches a finite number, y (i.e., the dependent variable) becomes arbitrarily large or small

looks like: $\lim_{x \rightarrow \text{number}} f(x) = \pm\infty$

- **Limits at infinity:** as x approaches an arbitrarily large or small number, y approaches a finite number

looks like: $\lim_{x \rightarrow \pm\infty} f(x) = \text{number}$

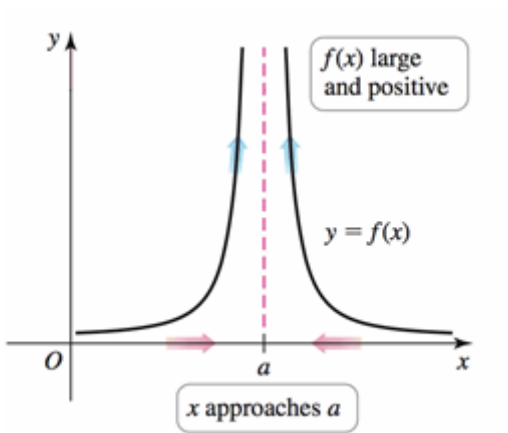
Definition of Infinite Limits

Definition (positively infinite limit)

Suppose f is defined for all x near a . If $f(x)$ grows arbitrarily large for all x sufficiently close (but not equal) to a , we write

$$\lim_{x \rightarrow a} f(x) = \infty$$

and say **the limit of $f(x)$ as x approaches a is infinity.**

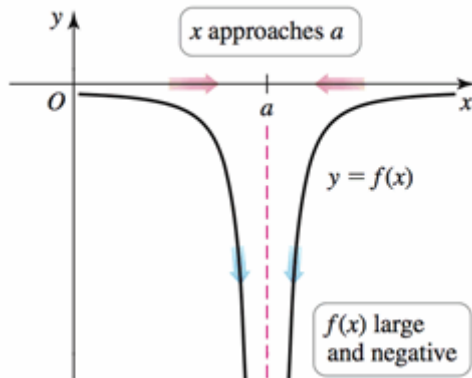


Definition (negatively infinite limit)

Suppose f is defined for all x near a . If $f(x)$ is negative and grows arbitrarily large in magnitude for all x sufficiently close (but not equal) to a , we write

$$\lim_{x \rightarrow a} f(x) = -\infty$$

and say **the limit of $f(x)$ as x approaches a is negative infinity**.



The definitions work for one-sided limits, too.

Exercise

Using a graph and a table of values, given $f(x) = \frac{1}{x^2 - x}$, determine:

(a) $\lim_{x \rightarrow 0^+} f(x)$

(b) $\lim_{x \rightarrow 0^-} f(x)$

(c) $\lim_{x \rightarrow 1^+} f(x)$

(d) $\lim_{x \rightarrow 1^-} f(x)$