Lesson 3

Read 2.2

The intuitive concept of limit

Assignment Previewer

hw02S2.1 (9966474)

Previewer Tools

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Current Score: 0/68 **Due:** Mon Jan 9 2017 11:00 PM PST

Question	1	2	3	4	5	6	7	8	Total
Points	0/10	0/12	0/11	0/10	0/14	0/4	0/4	0/3	0/68

1. 0/10 points — SCalcET7 2.1.007. [1608988]

The table shows the position of a cyclist.

t (seconds)	0	1	2	3	4	5
s (meters)	0	1.3	5.5	10.6	17.9	25.6

(a) Find the average velocity for each time period.

(i) [1, 3] _____ m/s

(ii) [2, 3] _____ m/s

(iii) [3, 5] _____ m/s

(iv) [3, 4] _____ m/s

(b) Estimate the instantaneous velocity when $t = 3$.

_____ m/s

2. 0/12 points — SCalcET7 2.1.001.MI. [3235104]

A tank holds 5000 gallons of water, which drains from the bottom of the tank in half an hour. The values in the table show the volume V of water remaining in the tank (in gallons) after t minutes.

t (min)	5	10	15	20	25	30
V (gal)	3475	2225	1275	545	125	0

(a) If P is the point (15, 1275) on the graph of V, find the slopes of the secant lines PQ when Q is the point on the graph with the following values. (Round your answers to one decimal place.)

Q	slope
(5, 3475)	
(10, 2225)	
(20, 545)	
(25, 125)	

2.2 Limits

Given some function f defined around $x = 2$, how do we compute $\lim_{x \to 2} f(x)$?
Graphical interpretation and conventions.

(two sided) limit

Asking to calculate $\lim_{x \to 2} f(x)$ is asking what happens to $f(x)$ when x gets closer and closer to 2.

Limit from the right

Asking to calculate $\lim_{x \to 2^+} f(x)$ is asking what happens to $f(x)$ when x gets closer and closer to 2 from the right, that is staying bigger than 2.

Limit from the left

Asking to calculate $\lim_{x \to 2^-} f(x)$ is asking what happens to $f(x)$ when x gets closer and closer to 2 from the left, that is staying smaller than 2.

Guess the values of $\lim_{x \to 0^+} \frac{1}{x}$, $\lim_{x \to 0^-} \frac{1}{x}$, $\lim_{x \to 0} \frac{1}{x}$ and $\lim_{x \to 0} \frac{1}{x^2}$

limits to infinity

(Limit to $+\infty$)

Asking to calculate $\lim_{x\to+\infty} f(x)$ is asking what happens to $f(x)$ when x gets bigger and bigger

(Limit to $-\infty$)

Asking to calculate $\lim_{x\to-\infty} f(x)$ is asking what happens to $f(x)$ when x gets more and more negative

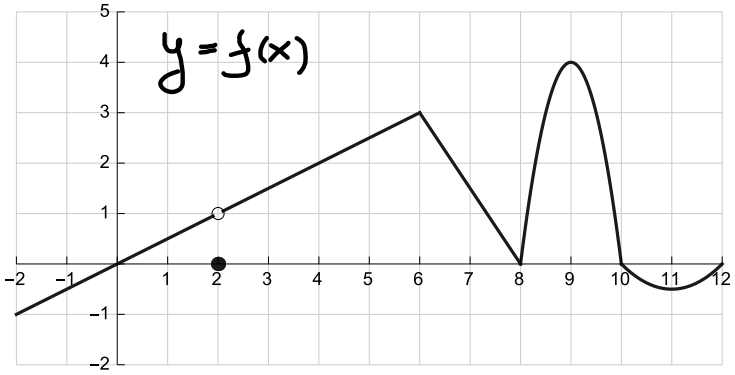
Guess the values of $\lim_{x\to\infty} \frac{1}{x}$, $\lim_{x\to-\infty} \frac{1}{x}$,$\lim_{x\to\infty} \frac{1}{x^2}$, $\lim_{x\to-\infty} \frac{1}{x^2}$, and $\lim_{x\to\infty} \sin x$,

The answer to the question : compute $\lim_{x \to \text{anything}} f(x)$ can be

- a number L
- $+\infty$
- $-\infty$
- DNE (for example when the limit from the right and the left are different, or when the function oscillates)

Caution: the book sometimes says that $\lim_{x \to *} f(x)$ DNE when instead it is ∞ or $-\infty$

4. (12 total points) For this problem, refer to the pictured graph of the function $y = f(x)$ on the interval [-2,12].



(a) (2 points) $\lim_{x\to 7} \dfrac{f(x)-f(7)}{x-7} =$

(b) (2 points) $\lim_{x\to 2} f(x) =$

(c) (2 points) $\lim_{x\to 2} f''(x) =$

(d) (2 points) $\lim_{x\to 2} \dfrac{f(x)}{x} =$

(e) (2 points) Circle the smallest number in this list:

$$f'(0) \qquad f'(1) \qquad f'(7) \qquad f'(9) \qquad f'(11)$$

(f) (2 points) Give an interval (a,b) on which $f'(x)$ is increasing.