1.4 Finding Limits from Tables
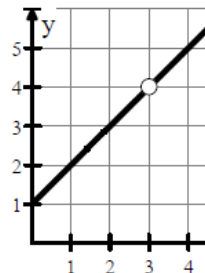
Calculator required for part of this lesson!

If we have the graph, it is easy to see the value of $\lim\limits_{x\to 3} f(x) =$

Without the graph, we could use a table of values.

x	2.9	2.99	3.01	3.1
$f(x)$	3.9	3.99	4.01	4.1

1. According to the table, what is the value of $\lim\limits_{x\to -4} f(x)$?

x	-4.4	-4.001	-3.999	-3.5
$f(x)$	2.43	2.499	2.501	2.68

2. If $f(x) = \dfrac{x^3 - 4x^2 - 7x + 10}{x+2}$, create your own table of values to help you evaluate $\lim\limits_{x\to -2} f(x)$.

x					
$f(x)$					

$$\lim\limits_{x\to -2} f(x) =$$

Several ways to find values of a function on a calculator. Here are two:
- Table values (not as accurate, but fast)
- Function Notation

3. The function f is continuous and increasing for $x \geq 1$. The table gives values of f at selected values of x. Approximate the value of $\lim\limits_{x\to 2} \cos(f(x))$.

x	1.99	1.999	2.001	2.01
$f(x)$	4.85	4.999	5.001	5.15

$$\lim\limits_{x\to 2} \cos(f(x)) =$$

Use the table for each problem to evaluate the limit.

1. $\lim\limits_{x \to 9} f(x) =$

x	8.7	8.999	9.001	9.8
$f(x)$	−5.8	−5.001	−4.999	−4

2. $\lim\limits_{x \to -7} f(x) =$

x	−7.5	−7.001	−6.999	−6.5
$f(x)$	3.8	3.501	3.499	3.2

3. $\lim\limits_{x \to -2} f(x) =$

x	−2.1	−2.001	−1.999	−1.9
$f(x)$	−8.7	−8.999	−9.001	−9.4

4. $\lim\limits_{x \to 11} f(x) =$

x	10.7	10.99	11.01	11.3
$f(x)$	10.3	10.001	9.999	9.6

For each function, create your own table of values to evaluate the limit.

5. $f(x) = \dfrac{x^2 - 2x - 35}{x + 5}$

x				
$f(x)$				

$$\lim\limits_{x \to -5} f(x) =$$

6. $f(x) = \dfrac{x^2 + 5x + 6}{x + 2}$

x				
$f(x)$				

$$\lim\limits_{x \to -2} f(x) =$$

7. $f(x) = \dfrac{x^2 + 4x - 12}{x - 2}$

x				
$f(x)$				

$$\lim\limits_{x \to 2} f(x) =$$

8. $f(x) = \dfrac{5x^3 + 2x^2 - 13x + 6}{x - 1}$

x				
$f(x)$				

$$\lim\limits_{x \to 1} f(x) =$$

Use the information given for each problem to evaluate the limit. Always round (or truncate) answers to three decimal places!

9. The function f is continuous and increasing $x \geq 0$. The table gives values of f at selected values of x.

x	6.9	6.999	7.001	7.1
$f(x)$	3.7	3.999	4.001	4.16

Approximate the value of $\lim\limits_{x \to 7} 2\cos(f(x))$.

10. The function f is continuous and decreasing for $x \geq 3$. The table gives values of f at selected values of x.

x	4.9	4.999	5.001	5.1
$f(x)$	2.2	2.001	1.999	1.75

Approximate the value of $\lim\limits_{x \to 5} e^{3f(x)}$.

11. The function f is continuous and decreasing for $x \geq -5$. The table gives values of f at selected values of x.

x	-3.1	-3.01	-2.99	-2.8
$f(x)$	-3.4	-3.499	-3.501	-3.8

Approximate the value of $\lim\limits_{x \to -3} \ln(-f(x))$.

12. The function f is continuous and increasing for $x \geq -7$. The table gives values of f at selected values of x.

x	-5.1	-5.001	-4.999	-4.8
$f(x)$	3.7	3.999	4.001	4.2

Approximate the value of $\lim\limits_{x \to -5} \sqrt[5]{f(x)}$.
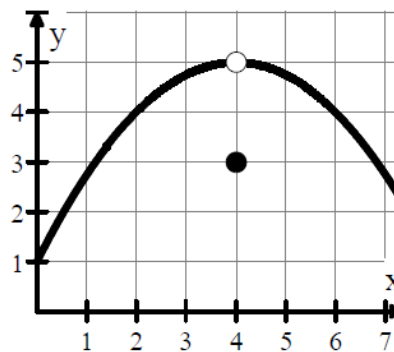
1.4 Finding Limits from Tables

13. The table below shows values of the function f at selected values of x. Which of the following is true based on the data from the table?

x	8.9	8.99	8.999	9.001	9.01	9.1
$f(x)$	0.7	0.8	0.999	2.001	2.01	2.3

(A) $\lim\limits_{x \to 9} f(x) = 1$

(B) $\lim\limits_{x \to 9} f(x) = 2$

(C) $\lim\limits_{x \to 9^-} f(x) = 2$ and $\lim\limits_{x \to 9^+} f(x) = 1$

(D) $\lim\limits_{x \to 9^-} f(x) = 1$ and $\lim\limits_{x \to 9^+} f(x) = 2$

14. The graph of the function f is shown to the right. The value of $\lim\limits_{x \to 4} 2\cos(f(x))$ is

(A) 0.567

(B) -1.307

(C) -1.979

(D) Does not exist

15. If $[x]$ represents the greatest integer that is less than or equal to x, then $\lim\limits_{x \to 0^-} \dfrac{2}{[x]} =$

(A) -2 　　　 (B) -1 　　　 (C) 0 　　　 (D) 2 　　　 (E) the limit does not exist

1.4 Finding Limits from Tables

Calculus

Practice

Use the table for each problem to evaluate the limit.

1. $\lim\limits_{x\to 9} f(x) =$ **−5**

x	8.7	8.999	9.001	9.8
$f(x)$	−5.8	−5.001	−4.999	−4

2. $\lim\limits_{x\to -7} f(x) =$ **3.5**

x	−7.5	−7.001	−6.999	−6.5
$f(x)$	3.8	3.501	3.499	3.2

3. $\lim\limits_{x\to -2} f(x) =$ **−9**

x	−2.1	−2.001	−1.999	−1.9
$f(x)$	−8.7	−8.999	−9.001	−9.4

4. $\lim\limits_{x\to 11} f(x) =$ **10**

x	10.7	10.99	11.01	11.3
$f(x)$	10.3	10.001	9.999	9.6

For each function, create your own table of values to evaluate the limit.

5. $f(x) = \dfrac{x^2-2x-35}{x+5}$

x	−5.1	−5.001	−5	−4.999	−4.9
$f(x)$	−12.1	−12.001	Und	−11.999	−11.9

$$\lim\limits_{x\to -5} f(x) = -12$$

6. $f(x) = \dfrac{x^2+5x+6}{x+2}$

x	−2.1	−2.001	−2	−1.999	−1.9
$f(x)$	0.9	0.999	Und	1.001	1.1

$$\lim\limits_{x\to -2} f(x) = 1$$

7. $f(x) = \dfrac{x^2+4x-12}{x-2}$

x	1.9	1.999	2	2.001	2.1
$f(x)$	7.9	7.999	Und	8.001	8.1

$$\lim\limits_{x\to 2} f(x) = 8$$

8. $f(x) = \dfrac{5x^3+2x^2-13x+6}{x-1}$

x	0.9	0.999	1	1.001	1.1
$f(x)$	4.35	5.983	Und	6.017	7.75

$$\lim\limits_{x\to 1} f(x) = 6$$

Use the information given for each problem to evaluate the limit. Always round (or truncate) answers to three decimal places!

9. The function f is continuous and increasing $x \geq 0$. The table gives values of f at selected values of x.

x	6.9	6.999	7.001	7.1
$f(x)$	3.7	3.999	4.001	4.16

Approximate the value of $\lim\limits_{x\to 7} 2\cos(f(x))$.

−1.307

10. The function f is continuous and decreasing for $x \geq 3$. The table gives values of f at selected values of x.

x	4.9	4.999	5.001	5.1
$f(x)$	2.2	2.001	1.999	1.75

Approximate the value of $\lim\limits_{x\to 5} e^{3f(x)}$.

403.4287

11. The function f is continuous and decreasing for $x \geq -5$. The table gives values of f at selected values of x.

x	-3.1	-3.01	-2.99	-2.8
$f(x)$	-3.4	-3.499	-3.501	-3.8

Approximate the value of $\lim\limits_{x \to -3} \ln(-f(x))$.

1.2527

12. The function f is continuous and increasing for $x \geq -7$. The table gives values of f at selected values of x.

x	-5.1	-5.001	-4.999	-4.8
$f(x)$	3.7	3.999	4.001	4.2

Approximate the value of $\lim\limits_{x \to -5} \sqrt[5]{f(x)}$.

1.3195

1.4 Finding Limits from Tables

Test Prep

13. The table below shows values of the function f at selected values of x. Which of the following is true based on the data from the table?

x	8.9	8.99	8.999	9.001	9.01	9.1
$f(x)$	0.7	0.8	0.999	2.001	2.01	2.3

(A) $\lim\limits_{x \to 9} f(x) = 1$

(B) $\lim\limits_{x \to 9} f(x) = 2$

(C) $\lim\limits_{x \to 9^-} f(x) = 2$ and $\lim\limits_{x \to 9^+} f(x) = 1$

(D) $\lim\limits_{x \to 9^-} f(x) = 1$ and $\lim\limits_{x \to 9^+} f(x) = 2$
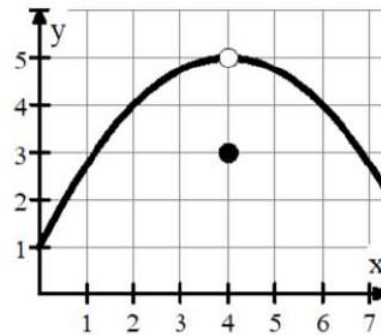
14. The graph of the function f is shown to the right. The value of $\lim\limits_{x \to 4} 2\cos(f(x))$ is

(A) 0.567

(B) -1.307

(C) -1.979

(D) Does not exist

15. If $[x]$ represents the greatest integer that is less than or equal to x, then $\lim\limits_{x \to 0^-} \dfrac{2}{[x]} = \dfrac{2}{[-0.00]} = \dfrac{2}{-1}$

(A) -2 (B) -1 (C) 0   (D) 2   (E) the limit does not exist