Calculus

1.3 Finding Limits from Graphs

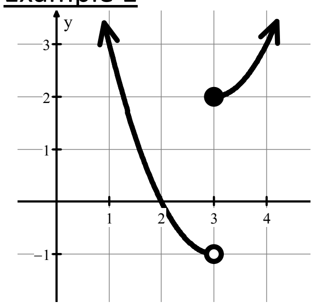
Notes

Write your questions and thoughts here!

<u>What is a *one-sided* limit?</u>

A ***one-sided limit*** is the _______ a function approaches as you approach a given __________ from either the _______ or _______ side.

<u>Example 1</u>



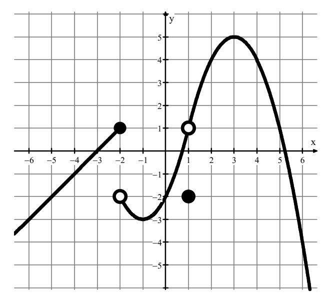
The limit of f as x approaches 3 from the left side is -1. $\lim\limits_{x\to} f(x) =$

The limit of f as x approaches 3 from the right side is 2. $\lim\limits_{x\to} f(x) =$

If the two sides are different? $\lim\limits_{x\to} f(x) =$

<u>Example 2</u>

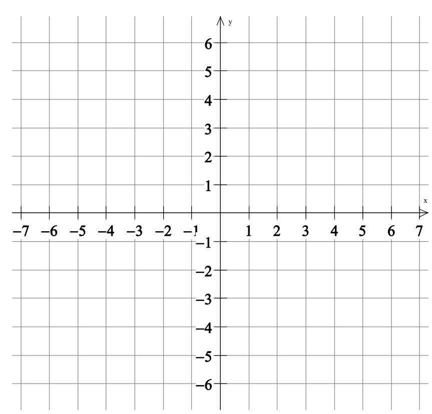
a. $\lim\limits_{x\to -2^-} f(x) =$	b. $\lim\limits_{x\to -2^+} f(x) =$	c. $\lim\limits_{x\to -2} f(x) =$
d. $\lim\limits_{x\to 1} f(x) =$	e. $\lim\limits_{x\to 0} f(x) =$	f. $\lim\limits_{x\to 3^-} f(x) =$
g. $\lim\limits_{x\to -1} f(x) =$	h. $f(1) =$	i. $f(-2) =$



<u>Example 3</u>

Sketch a graph of a function g that satisfies all of the following conditions.

a. $g(3) = -1$
b. $\lim\limits_{x\to 3} g(x) = 4$
c. $\lim\limits_{x\to -2^+} g(x) = 1$
d. g is increasing on $-2 < x < 3$
e. $\lim\limits_{x\to -2^-} g(x) > \lim\limits_{x\to -2^+} g(x)$



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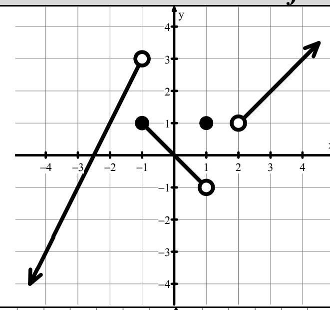
Calculus

Practice

For 1-3, give the value of each statement. If the value does not exist, write "*does not exist*" or "*undefined*."

1.

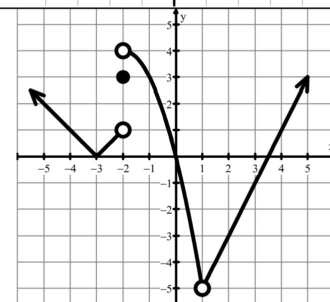


a. $\lim_{x\to -1^-} f(x) =$ b. $f(1) =$ c. $\lim_{x\to 0} f(x) =$

d. $\lim_{x\to 2^+} f(x) =$ e. $f(-1) =$ f. $f(2) =$

g. $\lim_{x\to -1^+} f(x) =$ h. $\lim_{x\to 1^-} f(x) =$ i. $\lim_{x\to 2} f(x) =$

2.

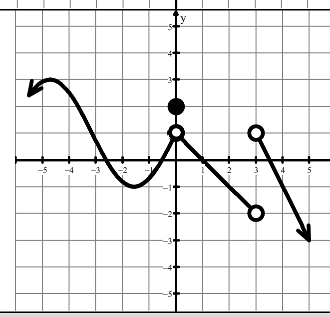


a. $\lim_{x\to -3} f(x) =$ b. $f(1) =$ c. $\lim_{x\to 1} f(x) =$

d. $\lim_{x\to -2^+} f(x) =$ e. $f(3) =$ f. $\lim_{x\to -2^-} f(x) =$

g. $\lim_{x\to -2} f(x) =$ h. $f(-2) =$ i. $f(4) =$

3.

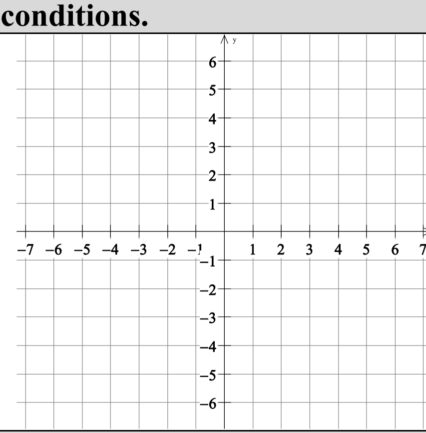


a. $\lim_{x\to 3^+} f(x) =$ b. $f(3) =$ c. $\lim_{x\to 0} f(x) =$

d. $\lim_{x\to 3} f(x) =$ e. $f(0) =$ f. $\lim_{x\to 3^-} f(x) =$

g. $\lim_{x\to 0^+} f(x) =$ h. $f(1) =$

4. Sketch a graph of a function f that satisfies all of the following conditions.



a. $f(-2) = 5$

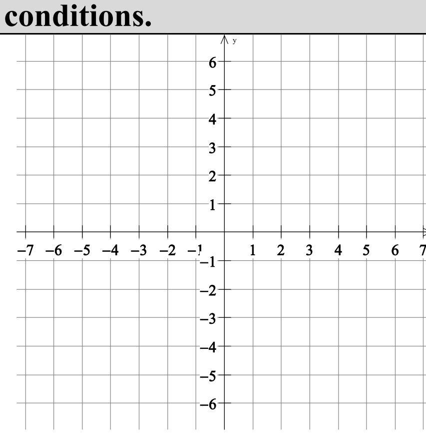
b. $\lim_{x\to -2} f(x) = 1$

c. $\lim_{x\to 4^+} f(x) = 3$

d. f is increasing on $x < -2$

e. $\lim_{x\to 4^-} f(x) < \lim_{x\to 4^+} f(x)$

5. Sketch a graph of a function g that satisfies all of the following conditions.



a. $g(1) = 3$

b. $\lim_{x\to 1} g(x) = -2$

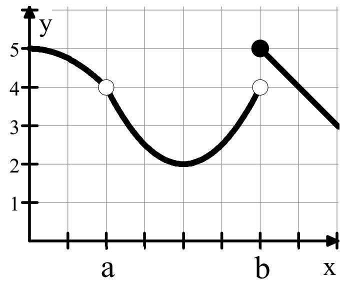
c. $\lim_{x\to -3^+} g(x) = 5$

d. g is increasing only on $-5 < x < -3$ and $x > 1$

e. $\lim_{x\to -3^-} g(x) > \lim_{x\to -3^+} g(x)$

1.3 Finding Limits from Graphs **Test Prep**

6. The graph of the function *f* is shown. Which of the following statements about *f* is true?



(A) $\lim_{x\to a} f(x) = \lim_{x\to b} f(x)$ (B) $\lim_{x\to a} f(x) = 4$

(C) $\lim_{x\to b} f(x) = 4$ (D) $\lim_{x\to b} f(x) = 5$

(E) $\lim_{x\to a} f(x)$ does not exist.

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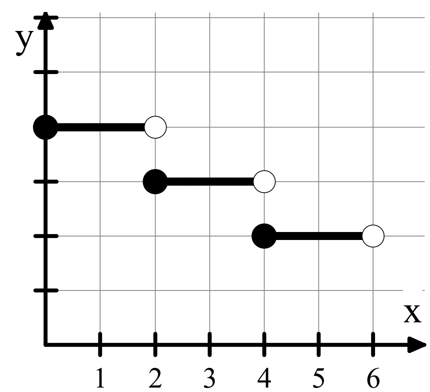
7. The figure below shows the graph of a function f with domain $0 \le x < 6$. Which of the following statements are true?

I. $\lim_{x\to 4^-} f(x)$ exists.
II. $\lim_{x\to 4^+} f(x)$ exists.
III. $\lim_{x\to 4} f(x)$ exists.



(A) I only (B) II only (C) I and II only (D) I and III only (E) I, II, and III

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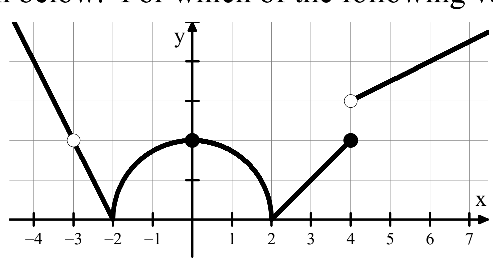
8. The graph of a function f is shown below. For which of the following values of c does $\lim_{x\to c} f(x) = 2$?



(A) 0 only (B) 0 and 4 only (C) -3 and 0 only

(D) -3 and 4 only (E) $-3, 0,$ and 4