

MANHATTAN COLLEGE  
DEPARTMENT OF MATHEMATICS  
Math 185-02/05    **Calculus I**    **Test 1** Makeup  
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Name:

Date: September 12, 2019

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**Instructions:** *This exam has 7 questions, for a total of 80 possible points. You are to work alone, and talk to no one about the exam (except CMH). You can check your notes, videos, book, and ask me questions. **BE SURE to use equal signs and the limit notation correctly, and simplify obvious things, such as  $6/8 = 3/4$  or  $\sqrt{1} = 1$ .***

*For full credit, SHOW ALL WORK. Getting a right answer is not enough. It must follow from what you did, except when you can read the answer off a graph.*

**You must print this out and write your solutions on this form. Advice: work the problems on scratch paper, write them up neatly and clearly on this form.**

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Question	Points	Score
1	5	
2	30	
3	10	
4	6	
5	14	
6	10	
7	5	
Total:	80	

1. (a) (5 points) Sketch a function that is defined at a point  $\mathbf{a}$  has a limit at  $\mathbf{a}$ , but  $\lim_{x \rightarrow a} f(x) \neq f(a)$ .

2. (10 points) Things you may not have observed. Suppose you want to find  $\lim_{x \rightarrow a} f(x)$  where  $f(x)$  is a rational function. Then  $(x - a)$  must be a factor of the bottom and the top! This may help you factor a tricky polynomial.

(a) (10 points) Find  $\lim_{x \rightarrow 1} \frac{x^3 + 4x^2 - 5x}{2x^2 + x - 3}$

(b) (10 points) Find  $\lim_{t \rightarrow -1} \frac{\sqrt{3t^2 + 1} - \sqrt{3t + 1}}{t - 1}$

3. (a) Find [10]  $\lim_{x \rightarrow -3} \sqrt{\frac{2x^2 + 9x + 9}{x^2 + 4x + 3}}$

(b) (10 points) Find  $\lim_{x \rightarrow 0} \frac{x + 7}{(4x)^2(x - 4)}$

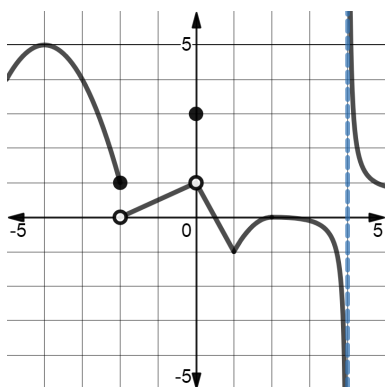
4. Given the function  $f(x) = \sqrt[3]{x^2 - 4}$ , which of the following exists? If it exists, state its value, if it does not explain (very briefly).

(a) (2 points)  $\lim_{x \rightarrow 2^-} f(x)$

(b) (2 points)  $\lim_{x \rightarrow 2^+} f(x)$

(c) (2 points)  $\lim_{x \rightarrow -2} f(x)$

5. Given the graph of  $f(x)$  below: Defined on  $(-5, 5)$



(a) (2 points)  $\lim_{x \rightarrow 0} f(x) = ?$

(b) (2 points)  $\lim_{x \rightarrow 2^-} f(x) = ?$

(c) (2 points)  $\lim_{x \rightarrow -2^+} f(x) = ?$

(d) (2 points)  $\lim_{x \rightarrow 2} f(x) = ?$

(e) (2 points)  $\lim_{x \rightarrow 1} f(x) = ?$

(f) (4 points) Find all points where the limit does not exist? And explain why each doesn't exist

6. (10 points) Given  $f(x) = \sqrt{2x}$ , find  $\lim_{x \rightarrow 0} \frac{f(x+h) - f(x)}{h}$  Work slowly and carefully, showing each step.

7. (5 points) I have worked on this entirely by myself, without discussing the test with anyone, except possibly my professor for this course.

Signed: \_\_\_\_\_