

Instructions: Calculators are allowed to be used on this test. There are 100 points. Show all work and simplify your answers! Correct answers without work will receive zero points. Also, points will be taken from messy solutions. **Good Luck!** ☺

Question	Points	Score
1	5	
2	6	
3	6	
4	5	
5	6	
6	10	
7	4	
8	6	
9	12	
10	6	
11	8	
12	8	
13	8	
14	6	
15	4	
Total:	100	

tests will have error codes next to question number to indicate what went wrong.

p = perfect!

1. (5 points) Tennessee ran for 148 yards during the football game against Georgia Tech. Does this mean that there was a time when the team had run for 100 yards? Explain your answer using something you learned in this class.



c : no notion of continuity
 a : passing yards, not running yards
 n : significant error

2. (6 points) Suppose we have that $-1 \leq f(x) \leq 4 \sin(x)$. Is this enough to find $\lim_{x \rightarrow 0} f(x)$? Explain.

dne: $f(1^-) \neq f(1^+) \Rightarrow$ limit DNE

e: exists

n: wrong justification

c: Don't know $f(x)$

d: no answer

3. (6 points) Assume that

$$\lim_{x \rightarrow \infty} f(x) = L \text{ and } \lim_{x \rightarrow L} g(x) = \infty.$$

Which of the following statements are correct? (Circle all that apply.)

a. $y = L$ is a horizontal asymptote of f .

m1: missing 1

b. $y = L$ is a horizontal asymptote of g .

m3: missing 3

c. $x = L$ is a vertical asymptote of f .

m4: all wrong

d. $x = L$ is a vertical asymptote of g .

all: circled all

m2: missing 2

4. (5 points) Suppose that the function $f(x)$ satisfies

$$\lim_{x \rightarrow 0^-} f(x) = 1, \quad \lim_{x \rightarrow 0^+} f(x) = 1, \quad \text{and} \quad f(0) = 2.$$

Is this function continuous at $x = 0$? Explain your reasoning.

yes: limits equal

d: no answer

5. (6 points) Where is $f(x) = \ln((4x - 2)^2)$ continuous? Explain your reasoning.

r or m: missing $x \neq \frac{1}{2}$

h: $(\frac{1}{2}, \infty)$

g: $x > 0$

w: significant error

b: $x \geq \frac{1}{2}$

a: algebra mistake

6. (10 points) Compute the instantaneous rate of change of $f(x) = \frac{1}{-x}$ at $x = 1$ using the limit definition.

d: used derivative

e: $\lim_{x \rightarrow 1} \frac{1}{-x}$

n: notation

plug: plugged in -1

m: gave definition but nothing else

w: no points

c: on right track

a: $\lim_{x \rightarrow 0}$

e: not enough work

no: no limit

wd: wrong def

B

7. (4 points) Give an example of a function with an indeterminate form at $x = 2$.

n : not indeterminate

d : didn't follow / doesn't make sense here

m : no answer

8. (6 points) Draw a graph of one function $f(x)$ with the following characteristics:

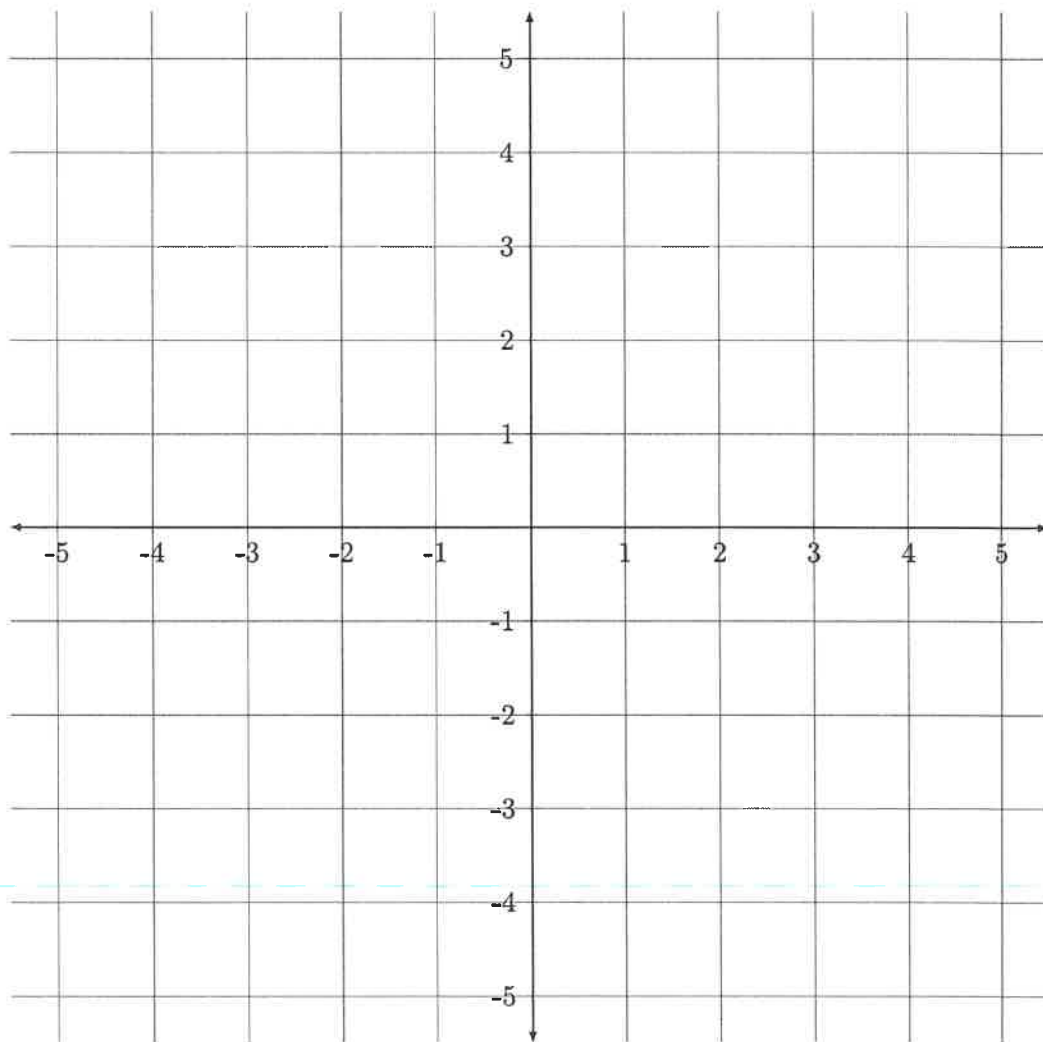
1 • $f(x)$ is continuous on the intervals $(-\infty, -2)$, $(-2, 2)$, and $(2, \infty)$.

2 • $\lim_{x \rightarrow \infty} f(x) = 3$ and $\lim_{x \rightarrow -\infty} f(x) = -3$.

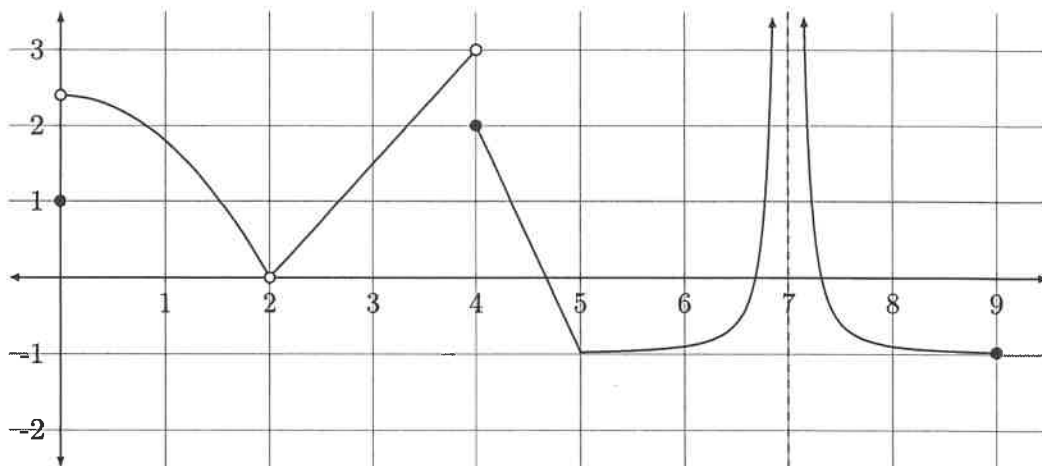
3 • $\lim_{x \rightarrow -2^-} f(x) = \infty$ and $\lim_{x \rightarrow -2^+} f(x) = -1$.

4 • $f(x)$ has a removable discontinuity at 2, but $f(2)$ exists.

m # = missing 1-4 pts



9. (12 points) The function $g(x)$ is graphed below. Use this graph to answer the following questions.



a. What is $g(0)$?

b. What is $\lim_{x \rightarrow 2} g(x)$?

m# = missing 1-6

c. What is $\lim_{x \rightarrow 4^-} g(x)$?

d. What is $\lim_{x \rightarrow 7} g(x)$?

e. What is the average rate of change of $g(x)$ on the interval $[4, 5]$?

f. List the x -value(s) in the interval $[0, 9]$ where $g(x)$ is NOT defined.

Compute the following limits. Show all your work! (40 points)

10. $\lim_{x \rightarrow 1} \left(\frac{1}{x-1} - \frac{2}{x^2-1} \right)$

* Sa: simple algebra

* ml: missing limits

vba: very bad algebra

* ba: bad algebra

d: didn't finish

n: missing

z: = 0

* nw: no work

* w: other

11. $\lim_{x \rightarrow -\infty} \frac{\sqrt{100x^2+1}}{5x+1}$

n: not negative + missing limits

s: simplification

m: not negative

j: wrong justification + ml

u: significant error

12. $\lim_{x \rightarrow 2} \left(\frac{x^2-4}{x^2+3x-10} \right)$

n: missing

$$13. \lim_{x \rightarrow 0} \frac{\sin(3x)}{\sin(6x)}$$

c : on right track

d : DNE

z : = 0

$$14. \lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x + 2}$$

d : DNE

a : arithmetic error

$$15. \lim_{x \rightarrow 1^-} \frac{1}{x - 1}$$

g : algebra error

w : significant error

l : wrong $x \rightarrow \square$

h : half correct

n : miss. \rightarrow

i : ∞

d : DNE