

scott.sutherland@stonybrook.edu [Sign out](#)[Home](#) [My Assignments](#) [Grades](#) [Communication](#)[Calendar](#)[My eBooks](#)[← -MAT 125 Calculus A - Fall 2026 \(all sections\), Fall 2026](#)

INSTRUCTOR

Scott Sutherland

SUNY Stony Brook University

MAT125 HW3 - limits and continuity (Homework)

Due Date: MON, SEP 14, 2026 8:00 AM EDT

[REQUEST EXTENSION](#)

Current Score: - / 58 POINTS | 0.0 %

Scoring and Assignment Information

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
POINTS	- / 6	- / 6	- / 1	- / 2	- / 1	- / 1	- / 3	- / 1	- / 1	- / 1	- / 1	- / 5	- / 1	- / 6	- / 1	- / 8	- / 1	- / 2	- / 2	- / 1	- / 1	- / 1	- / 4	- / 1

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

1. [- / 6 Points]

[DETAILS](#)[MY NOTES](#)[ASK YOUR TEACHER](#)

SCalcCC5 2.3.001.

Given that

$$\lim_{x \rightarrow 2} f(x) = 1 \quad \lim_{x \rightarrow 2} g(x) = -2 \quad \lim_{x \rightarrow 2} h(x) = 0,$$

find each limit, if it exists. (If an answer does not exist, enter DNE.)

(a) $\lim_{x \rightarrow 2} [f(x) + 4g(x)]$

(b) $\lim_{x \rightarrow 2} [g(x)]^3$

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

(d) $\lim_{x \rightarrow 2} \frac{2f(x)}{g(x)}$

(e) $\lim_{x \rightarrow 2} \frac{g(x)}{h(x)}$

(f) $\lim_{x \rightarrow 2} \frac{g(x)h(x)}{f(x)}$

2. [- / 6 Points]

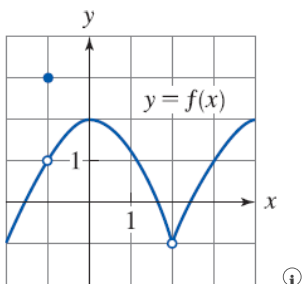
DETAILS

MY NOTES

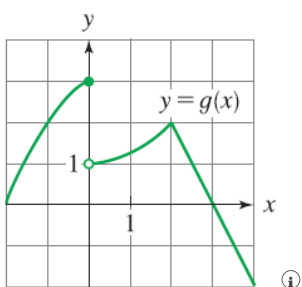
ASK YOUR TEACHER

SCalcCC5 2.3.002.

The graphs of f and g are given. Use them to evaluate each limit, if it exists. (If an answer does not exist, enter DNE.)



i



i

(a) $\lim_{x \rightarrow 2} [f(x) + g(x)]$

(b) $\lim_{x \rightarrow 0} [f(x) - g(x)]$

(c) $\lim_{x \rightarrow -1} [f(x)g(x)]$

(d) $\lim_{x \rightarrow 3} \frac{f(x)}{g(x)}$

(e) $\lim_{x \rightarrow 2} [x^2 f(x)]$

(f) $f(-1) + \lim_{x \rightarrow -1} g(x)$

3. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.007.

Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x \rightarrow 8} \left(1 + \sqrt[3]{x} \right) (3 - 5x^2 + x^3)$$

4. [- / 2 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.010.

(a) What is wrong with the following equation?

$$\frac{x^2 + x - 30}{x - 5} = x + 6$$

- ☐ $(x - 5)(x + 6) \neq x^2 + x - 30$
☐ The left-hand side is not defined for $x = 0$, but the right-hand side is.
☐ The left-hand side is not defined for $x = 5$, but the right-hand side is.
☐ None of these — the equation is correct.

(b) In view of part (a), explain why the following equation is correct.

$$\lim_{x \rightarrow 5} \frac{x^2 + x - 30}{x - 5} = \lim_{x \rightarrow 5} (x + 6)$$

- ☐ Since $\frac{x^2 + x - 30}{x - 5}$ and $x + 6$ are both continuous, the equation follows.
☐ Since the equation holds for all $x \neq 5$, it follows that both sides of the equation approach the same limit as $x \rightarrow 5$.
☐ This equation follows from the fact that the equation in part (a) is correct.
☐ None of these — the equation is not correct.

5. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.016.

Find the limit. (If an answer does not exist, enter DNE.)

$$\lim_{x \rightarrow 2} \frac{x^2 - 7x + 10}{x - 2}$$

6. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.021.MI.

Find the limit. (If an answer does not exist, enter DNE.)

$$\lim_{h \rightarrow 0} \frac{(9 + h)^3 - 729}{h}$$

7. [- / 3 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.041.MI.SA.

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

If $2x - 1 \leq f(x) \leq x^2 - 2x + 3$ for $x \geq 0$, find $\lim_{x \rightarrow 2} f(x)$.

[Click here to begin!](#)

8. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.043.

Evaluate the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \rightarrow 0} x^2 \cos\left(\frac{8}{x}\right)$$

9. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.046.MI.

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \rightarrow -1} \frac{4x + 4}{|x + 1|}$$

10. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.050.

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \rightarrow 0^+} \left(\frac{2}{x} - \frac{2}{|x|} \right)$$

11. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.049.

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \rightarrow 0^-} \left(\frac{8}{x} - \frac{8}{|x|} \right)$$

12. [- / 5 Points]

DETAILS

MY NOTES

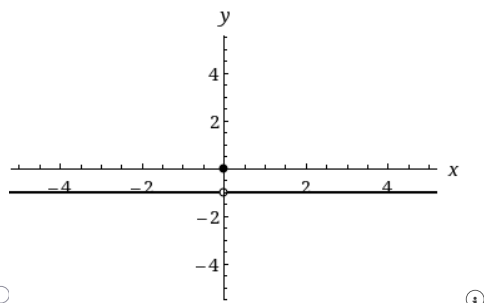
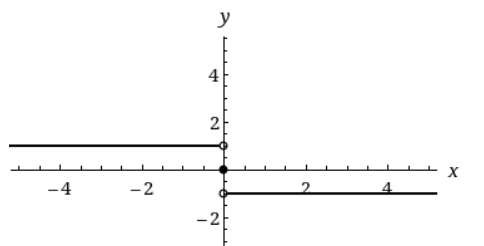
ASK YOUR TEACHER

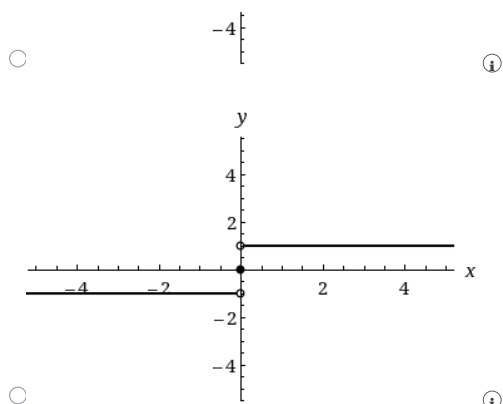
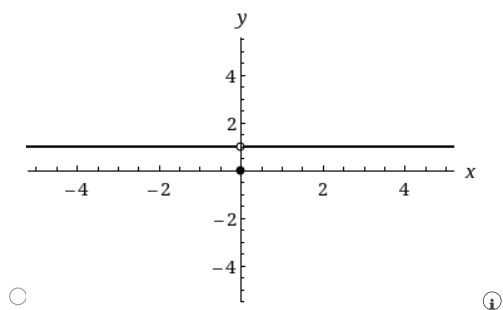
SCalcCC5 2.3.051.

The *signum*, or *sign*, function, denoted by sgn , is defined by

$$\text{sgn}(x) = \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 & \text{if } x > 0 \end{cases}$$

(a) Sketch the graph of this function.





(b) Find each of the following limits. (If an answer does not exist, enter DNE.)

(i) $\lim_{x \rightarrow 0^+} \text{sgn}(x)$

(ii) $\lim_{x \rightarrow 0^-} \text{sgn}(x)$

(iii) $\lim_{x \rightarrow 0} \text{sgn}(x)$

(iv) $\lim_{x \rightarrow 0} |\text{sgn}(x)|$

13. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.3.070.

Evaluate $\lim_{x \rightarrow 3} \frac{\sqrt{19 - x} - 4}{\sqrt{4 - x} - 1}$.

14. [- / 6 Points]

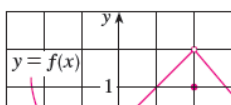
DETAILS

MY NOTES

ASK YOUR TEACHER

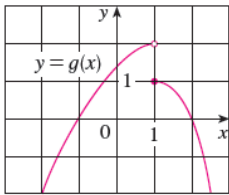
SCalcCC5 2.3.501.XP.

The graphs of f and g are given. Use them to evaluate each limit, if it exists. (If an answer does not exist, enter DNE.)





ⓘ



ⓘ

(a) $\lim_{x \rightarrow 2} [f(x) + g(x)]$

(b) $\lim_{x \rightarrow 1} [f(x) + g(x)]$

(c) $\lim_{x \rightarrow 0} [f(x)g(x)]$

(d) $\lim_{x \rightarrow -1} \frac{f(x)}{g(x)}$

(e) $\lim_{x \rightarrow 2} [x^3 f(x)]$

(f) $\lim_{x \rightarrow 1} \sqrt{3 + f(x)}$

15. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.001.

Write an equation that expresses the fact that a function f is continuous at the number 7.

$\lim_{7 \rightarrow x} \bigcirc f(7) = f(x)$

$\lim_{x \rightarrow 7} \bigcirc f(7) = f(x)$

$\lim_{x \rightarrow 7^+} \bigcirc \lim_{x \rightarrow 7^-} f(x) = f(7)$

$\lim_{7 \rightarrow x} \bigcirc f(x) = f(7)$

$\lim_{x \rightarrow 7} \bigcirc f(x) = f(7)$

16. [- / 8 Points]

DETAILS

MY NOTES

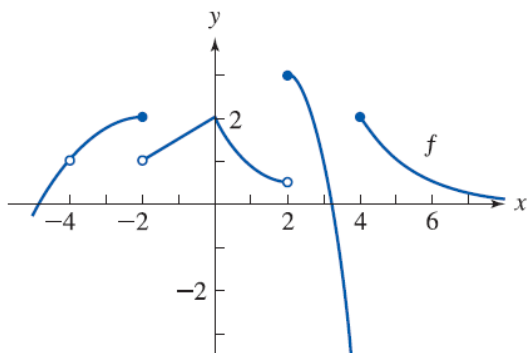
ASK YOUR TEACHER

SCalcCC5 2.4.003.MI.SA.

This question has several parts that must be completed sequentially. If you skip a part of the question, you will not receive any points for the skipped part, and you will not be able to come back to the skipped part.

Tutorial Exercise

Use the graph to determine the x -values at which f is discontinuous. For each x -value, determine whether f is continuous from the right, from the left, or neither.



①

[Click here to begin!](#)

17. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.011.

Which of the following are continuous functions? (Select all that apply.)

- ☐ The temperature at a specific location as a function of time.
- ☐ The temperature at a specific time as a function of the distance due west from New York City.
- ☐ The altitude above sea level as a function of the distance due west from New York City.
- ☐ The cost of a taxi ride as a function of the distance traveled.
- ☐ The current in the circuit for the lights in a room as a function of time.
- ☐ None of these.

18. [- / 2 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.020.

Explain why the function is discontinuous at the given number a . (Select all that apply.)

$$f(x) = \begin{cases} \frac{x^2 - 5x}{x^2 - 25} & \text{if } x \neq 5 \\ 1 & \text{if } x = 5 \end{cases} \quad a = 5$$

$\lim_{x \rightarrow 5^+} f(x)$ and $f(5)$ are finite, but are not equal.

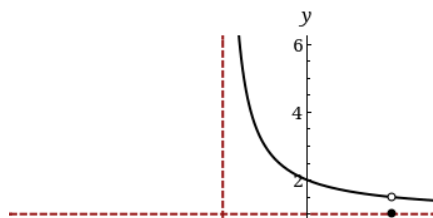
☐ $f(5)$ is defined and $f(x)$ is finite, but they are not equal.

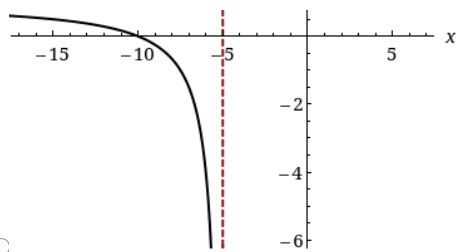
$\lim_{x \rightarrow 5} f(x)$ does not exist.

☐ $f(5)$ is undefined.

☐ none of the above

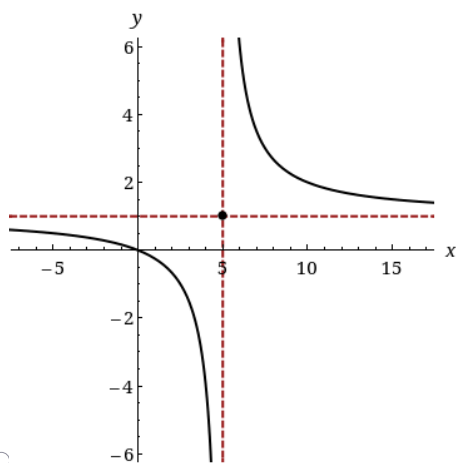
Sketch the graph of the function.





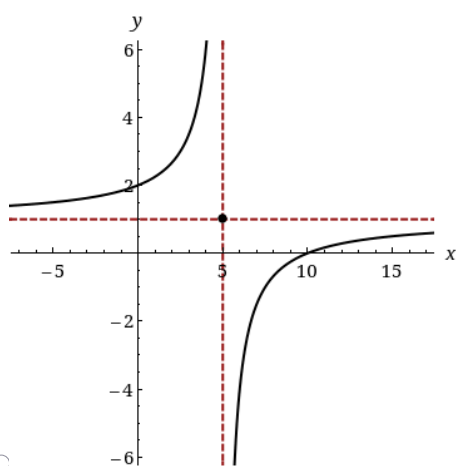
○

i



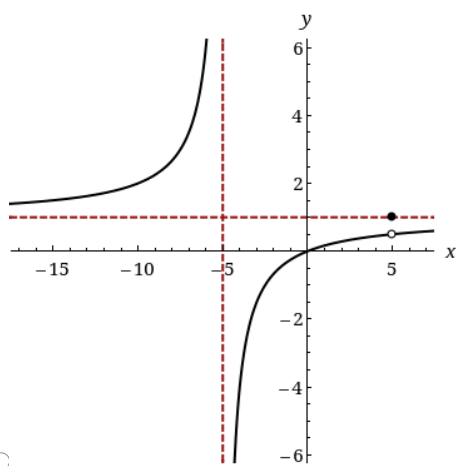
○

i



○

i



○

i

19. [- / 2 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.022.

Explain why the function is discontinuous at the given number a . (Select all that apply.)

$$f(x) = \begin{cases} \frac{2x^2 - 7x - 4}{x - 4} & \text{if } x \neq 4 \\ 8 & \text{if } x = 4 \end{cases} \quad a = 4$$

$\lim_{x \rightarrow 4^+} f(x)$ and $f(x)$ are finite, but are not equal.

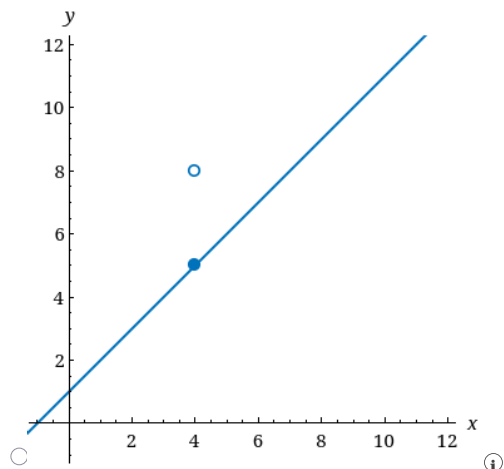
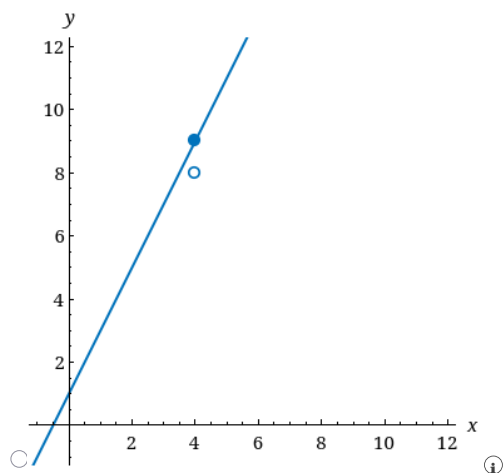
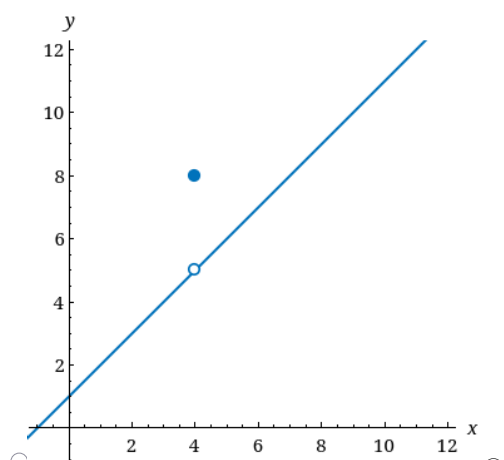
☐ $f(4)$ is undefined.

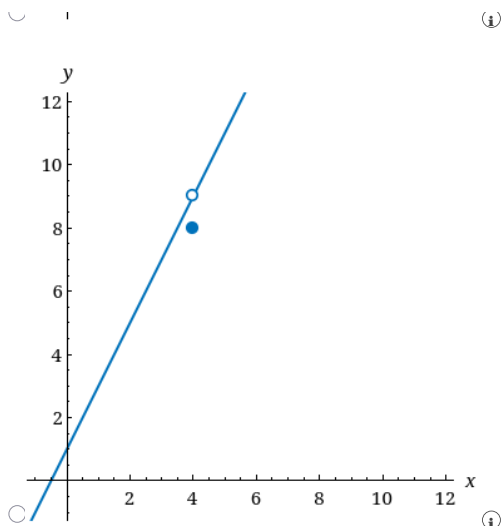
$\lim_{x \rightarrow 4} f(x)$ does not exist.

☐ $\lim_{x \rightarrow 4} f(x)$ and $f(x)$ are finite, but are not equal.

☐ none of the above

Sketch the graph of the function.





20. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.025.

For the function f , how would you *remove the discontinuity*? In other words, how would you define $f(2)$ in order for f to be continuous at 2?

$$f(x) = \frac{4 - \sqrt{x^2 + x + 10}}{x - 2}$$

$$f(2) = \boxed{}$$

21. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.036.MI.

Use continuity to evaluate the limit.

$$\lim_{x \rightarrow 5} x\sqrt{41 - x^2}$$

22. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.050.MI.

Suppose f and g are continuous functions such that

$$g(3) = 6 \text{ and } \lim_{x \rightarrow 3} [3f(x) + f(x)g(x)] = 36.$$

Find $f(3)$.

23. [- / 4 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.057.

Use the Intermediate Value Theorem to show that there is a root of the given equation in the specified interval.

$$e^x = 7 - 6x, \quad (0, 1)$$

The equation $e^x = 7 - 6x$ is equivalent to the equation $f(x) = e^x - 7 + 6x = 0$. $f(x)$ is continuous on the interval $[0, 1]$, $f(0) =$, and

$f(1) =$. Since $< 0 <$, there is a number c in $(0, 1)$ such that $f(c) = 0$ by the Intermediate Value Theorem. Thus,

there is a root of the equation $e^x = 7 - 6x$, in the interval $(0, 1)$.

24. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.4.070.

Is there a number that is exactly 4 more than its cube?

☐ Yes☐ No[Home](#) [My Assignments](#) [!\[\]\(67b99c4d964e257c5482ff1b2462b204_img.jpg\) Request Extension](#)

Copyright © 1998 - 2026 Cengage Learning, Inc. All Rights Reserved

[TERMS OF USE](#) [PRIVACY](#)