

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

HW4: limits with infinity, derivatives (Homework)

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SUNY Stony Brook University

Due Date: MON, SEP 21, 2026 9:00 AM EDT

REQUEST EXTENSION

Current Score: - / 28 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
POINTS	- / 1	- / 7	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 1	- / 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. [- / 1 Points]

DETAILS

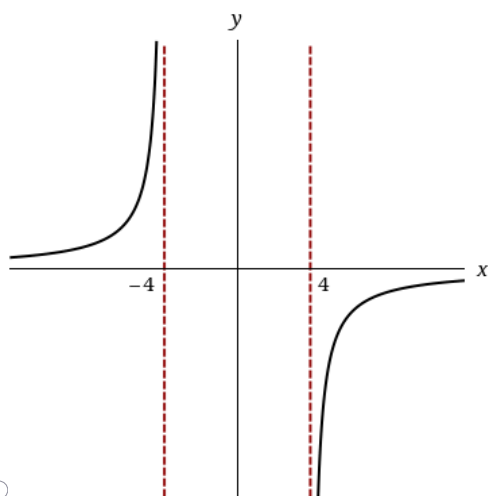
MY NOTES

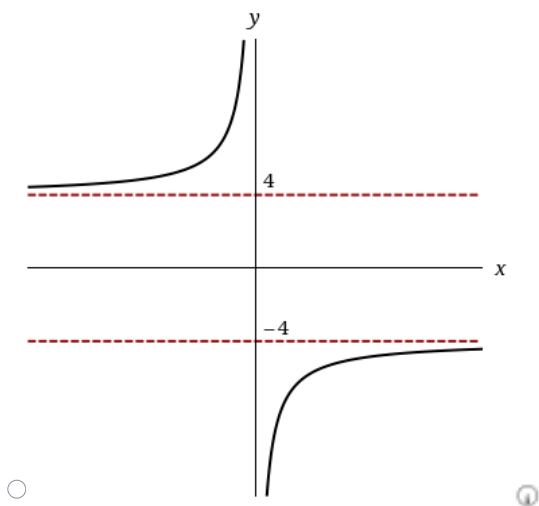
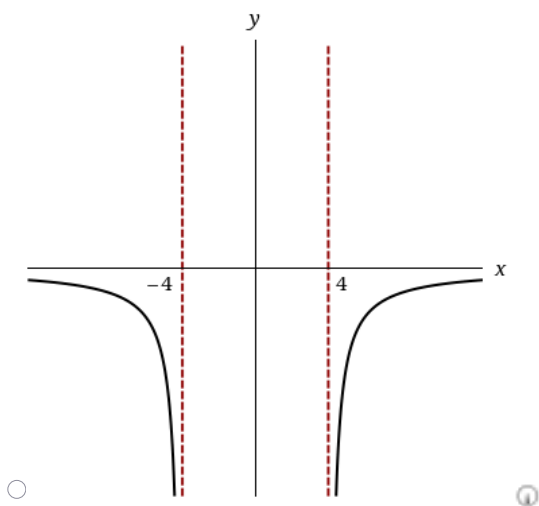
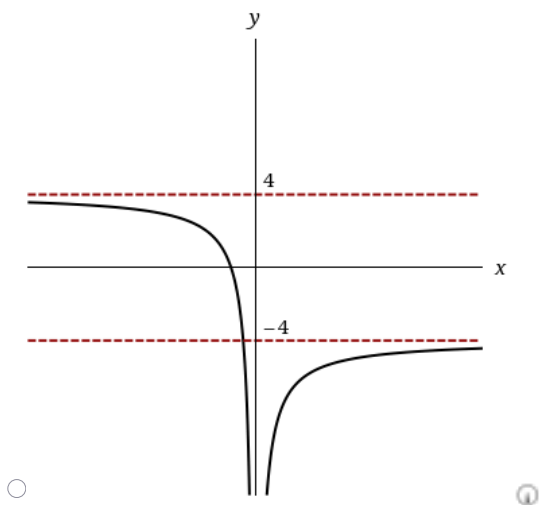
ASK YOUR TEACHER

SCalcCC5 2.5.005.

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

$$\lim_{x \rightarrow 0} f(x) = -\infty, \quad \lim_{x \rightarrow -\infty} f(x) = 4, \quad \lim_{x \rightarrow \infty} f(x) = -4$$





2. [- / 7 Points]

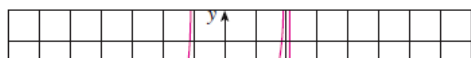
DETAILS

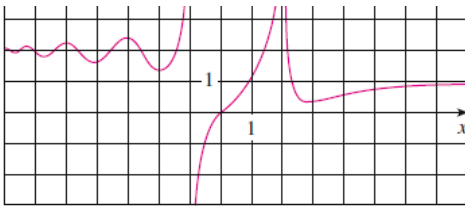
MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.5.003.

For the function f whose graph is given, state the following. (If the limit is infinite, enter ' ∞ ' or ' $-\infty$ ', as appropriate. If the limit does not otherwise exist, enter DNE.)





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

(b) $\lim_{x \rightarrow -1^-} f(x)$

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

(d) $\lim_{x \rightarrow \infty} f(x)$

(e) $\lim_{x \rightarrow -\infty} f(x)$

(f) the equations of the asymptotes (Enter your answers as comma-separated lists of equations.)

vertical

horizontal

3. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.5.016.MI.

Find the limit. (If the limit is infinite, enter ' ∞ ' or ' $-\infty$ ', as appropriate. If the limit does not otherwise exist, enter DNE.)

$$\lim_{x \rightarrow -4^-} \frac{x+5}{x+4}$$

4. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.5.019.

Find the limit. (If the limit is infinite, enter ' ∞ ' or ' $-\infty$ ', as appropriate. If the limit does not otherwise exist, enter DNE.)

$$\lim_{x \rightarrow 8^+} \ln(x^2 - 64)$$

5. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.5.031.

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

$$\lim_{t \rightarrow \infty} \frac{\sqrt{t} + t^2}{4t - t^2}$$

6. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.5.044.

Find the limit. (If the limit is infinite, enter ' ∞ ' or ' $-\infty$ ', as appropriate. If the limit does not otherwise exist, enter DNE.)

$$\lim_{x \rightarrow \infty} 6 \cos(x)$$

7. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.5.053.

$$\text{Let } f(x) = \frac{2}{x-5} - \frac{1}{\ln(x-5)}.$$

(a) Find each of the following limits. (If the limit is infinite, enter ' ∞ ' or ' $-\infty$ ', as appropriate. If the limit does not otherwise exist, enter DNE.)

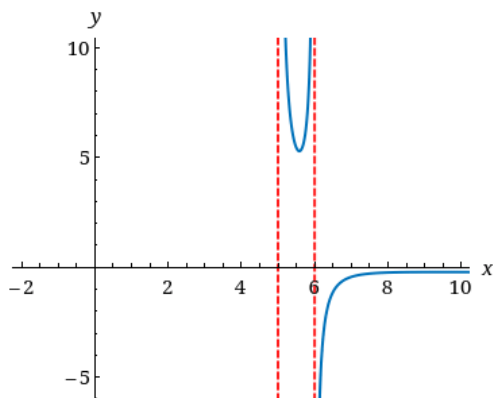
(i) $\lim_{x \rightarrow \infty} f(x)$

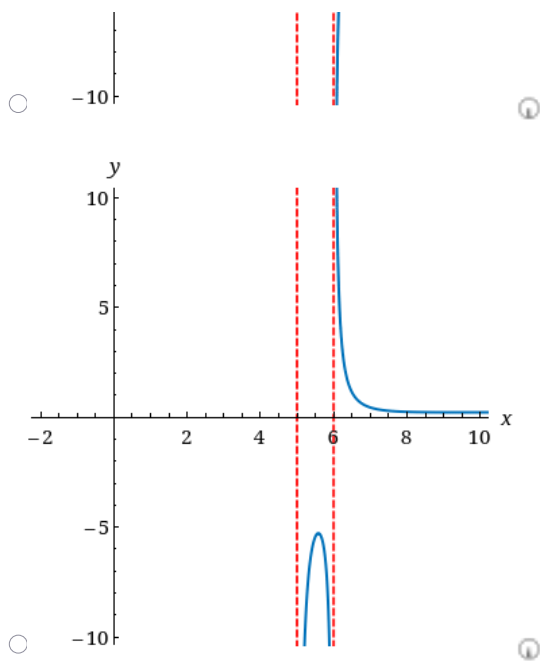
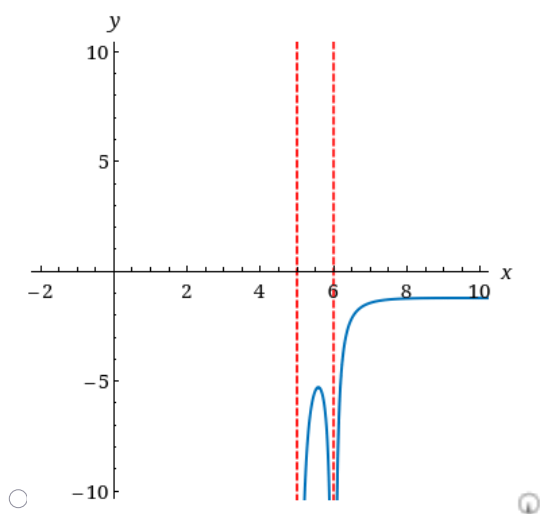
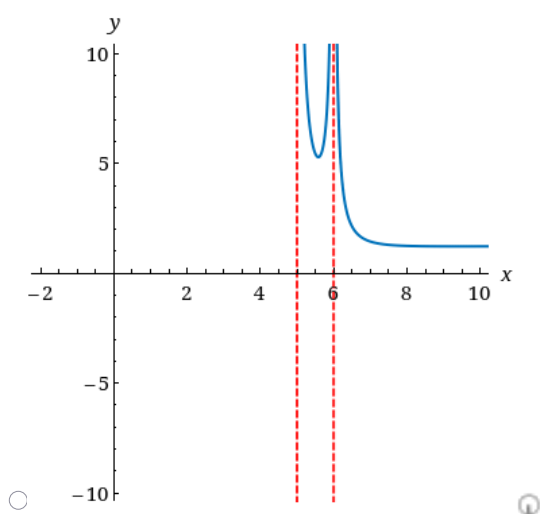
(ii) $\lim_{x \rightarrow 5^+} f(x)$

(iii) $\lim_{x \rightarrow 6^-} f(x)$

(iv) $\lim_{x \rightarrow 6^+} f(x)$

(b) Use the information from part (a) to make a rough sketch of the graph of f .





8. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.001.

A curve has equation $y = f(x)$.(a) Write an expression for the slope of the secant line through the points $P(8, f(8))$ and $Q(x, f(x))$.

- ☐ $\frac{f(x) - x}{f(8) - 8}$
- ☐ $\frac{f(8) - 8}{f(x) - x}$
- ☐ $\frac{f(x) - f(8)}{x - 8}$
- ☐ $\frac{x - 8}{f(x) - f(8)}$

(b) Write an expression for the slope of the tangent line at P .

$$\lim_{x \rightarrow 8} \frac{f(x) - f(8)}{x - 8}$$

$$\lim_{x \rightarrow f(8)} \frac{x - 8}{f(x) - f(8)}$$

$$\lim_{x \rightarrow 0} \frac{f(x) - f(8)}{x - 8}$$

$$\lim_{x \rightarrow f(8)} \frac{f(x) - x}{f(8) - 8}$$

9. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.007.

Find an equation of the tangent line to the graph of f at the given point.

$$y = x^3 - 3x + 1, \quad (3, 19)$$

$$y = \boxed{}$$

10. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.008.MI.

Find an equation of the tangent line to the graph of f at the given point.

$$f(x) = \sqrt{x}, \quad (49, 7)$$

$$y = \boxed{}$$

11. [- / 1 Points]

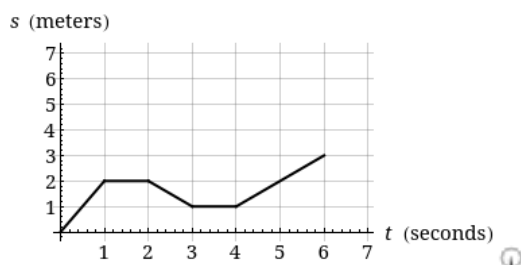
DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.012.

A particle starts by moving to the right along a horizontal line; the graph of its position function is shown in the figure.



(a) When is the particle moving to the right? (Select all that apply.)

- ☐ (0, 1)

☐ (1, 2)

☐ (2, 3)

☐ (3, 4)

☐ (4, 6)

When is the particle moving to the left? (Select all that apply.)

☐ (0, 1)

☐ (1, 2)

☐ (2, 3)

☐ (3, 4)

☐ (4, 6)

When is the particle standing still? (Select all that apply.)

☐ (0, 1)

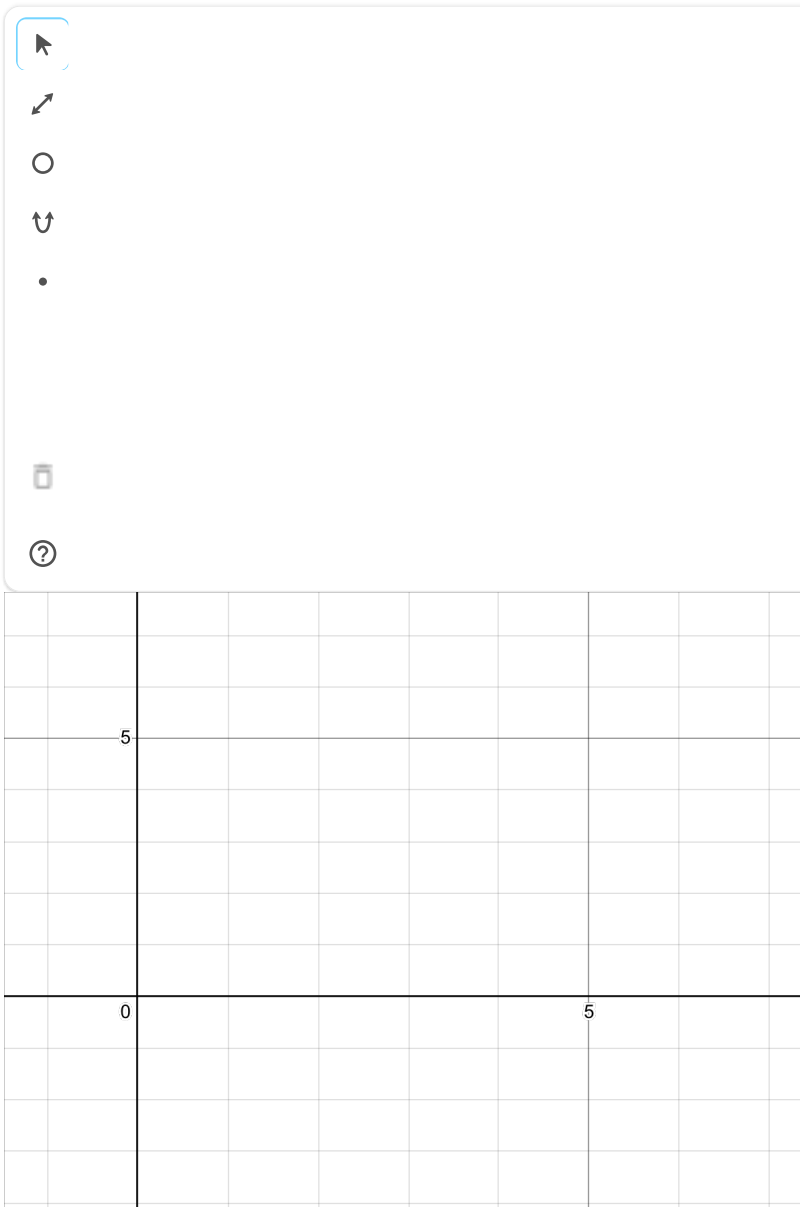
☐ (1, 2)

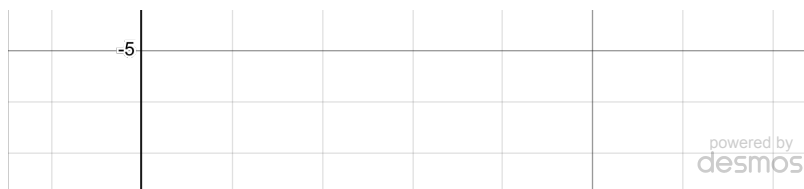
☐ (2, 3)

☐ (3, 4)

☐ (4, 6)

(b) Draw a graph of the velocity function.



**Objects**

No objects

After you add an object to the graph you can use this panel to view and edit its properties.

12. [- / 1 Points]

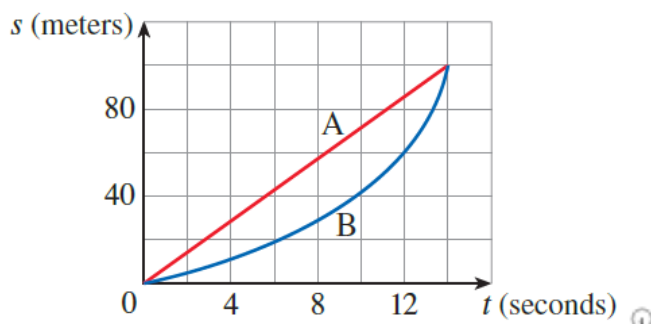
DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.013.

The following graph shows the position functions of two runners, A and B, who run a 100-meter race and finish in a tie.



(a) Describe and compare how the runners run the race.

- ☐ Runner A runs the entire race at the same velocity. Runner B starts the race at a slower velocity than runner A but finishes the race at a faster velocity.
- ☐ Runner A runs the entire race at the same velocity. Runner B starts the race at a faster velocity than runner A but finishes the race at a slower velocity.
- ☐ Runner A and runner B both start and end the race at the same velocities.
- ☐ Runner A starts the race at a slower velocity than runner B but finishes the race at a faster velocity. Runner B runs the entire race at the same velocity.
- ☐ Runner A starts the race at a faster velocity than runner B but finishes the race at a slower velocity. Runner B runs the entire race at the same velocity.

(b) How long after the race began (in seconds) is the distance between the runners the greatest?

 s

(c) How long after the race began (in seconds) do the runners have the same velocity?

 s

13. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.015.MI.

If a rock is thrown upward on the planet Mars with a velocity of 17 m/s, its height above the ground (in meters) after t seconds is given by $H = 17t - 1.86t^2$.

- (a) Find the velocity (in m/s) of the rock after 1 second.

 m/s

- (b) Find the velocity (in m/s) of the rock when $t = a$.

 m/s

- (c) When (in seconds) will the rock hit the surface? (Round your answer to one decimal place.)

 $t =$ s

- (d) With what velocity (in m/s) will the rock hit the surface?

 m/s

14. [- / 1 Points]

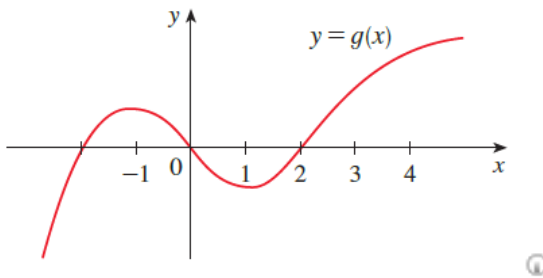
DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.6.019.

The graph of function g is given.



Arrange the following numbers in increasing order.

 $0, \quad g'(-2), \quad g'(0), \quad g'(2), \quad g'(4)$

- ☐ $0 < g'(4) < g'(2) < g'(0) < g'(-2)$
☐ $g'(0) < 0 < g'(-2) < g'(2) < g'(4)$
☐ $g'(0) < 0 < g'(4) < g'(2) < g'(-2)$
☐ $g'(-2) = g'(0) = g'(2) = 0 < g'(4)$
☐ $g'(0) < 0 < g'(4) < g'(-2) < g'(2)$

Explain your reasoning.

There are only two nonpositive values, the smallest of which is . The next smallest value is , since the other values are all positive. The slope at $x =$ is the next smallest slope since it is smaller than the slope at $x =$, and both of these are smaller than the slope at $x =$.

15. [- / 1 Points]

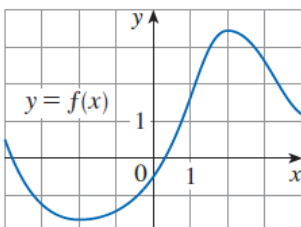
DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.7.001.

Use the given graph to estimate the value of each derivative.



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Q

(a) $f'(-3)$

(b) $f'(-2)$

(c) $f'(-1)$

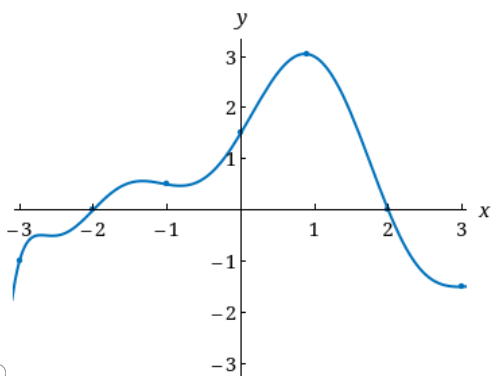
(d) $f'(0)$

(e) $f'(1)$

(f) $f'(2)$

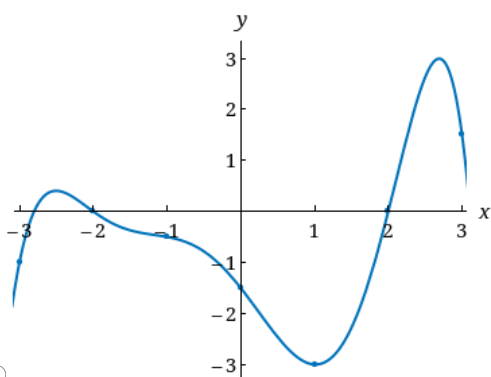
(g) $f'(3)$

Sketch the graph of f' .



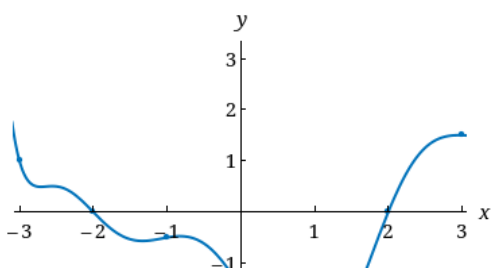
Q

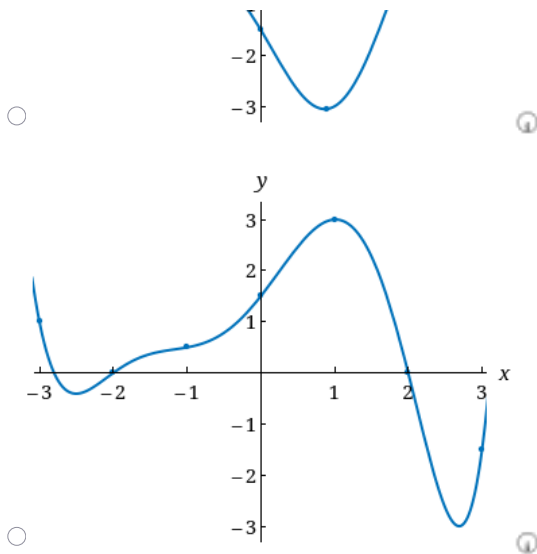
Q



Q

Q





16. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

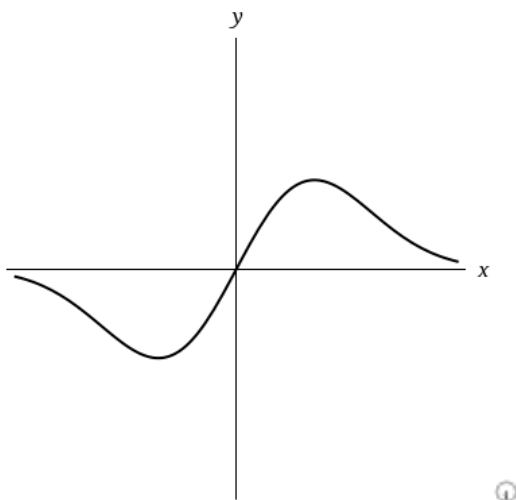
SCalcCC5 2.7.003.MI.SA.

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.

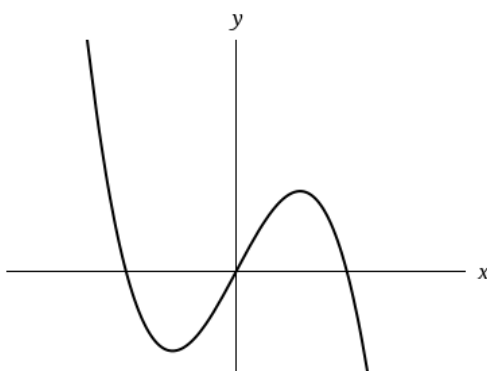
Tutorial Exercise

The graphs of four derivatives are given below. Match the graph of each function in (a)-(d) with the graph of its derivative in I-IV.

I

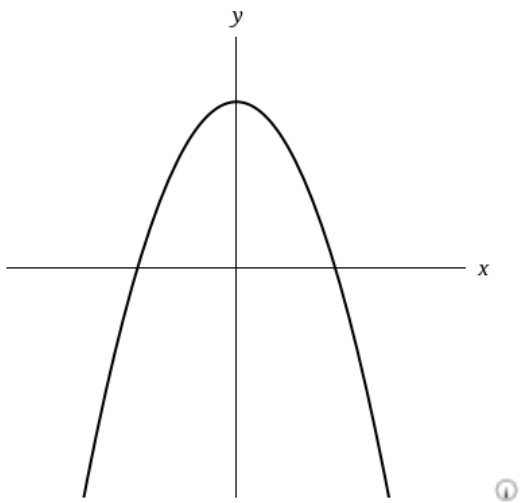


II

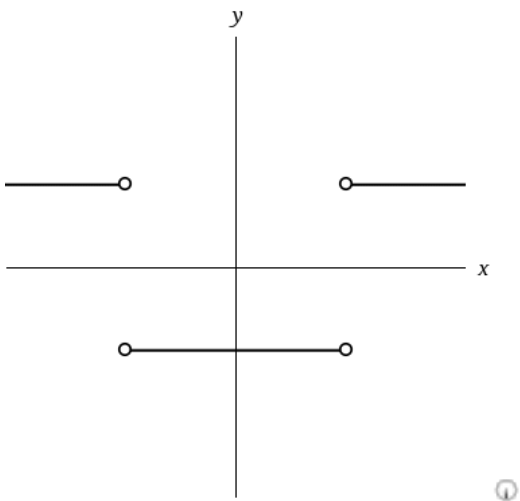




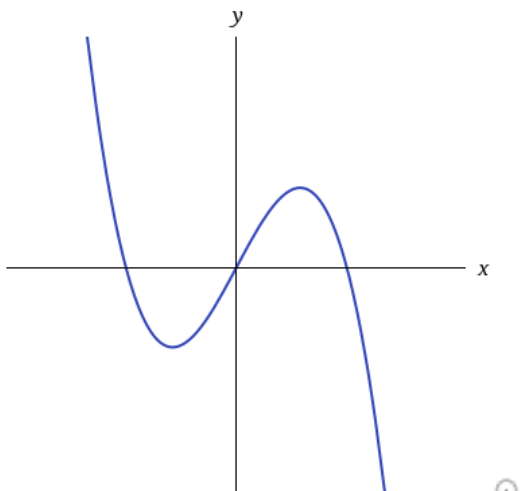
III



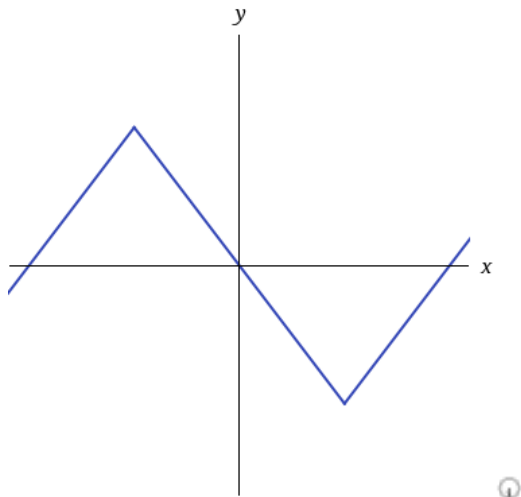
IV



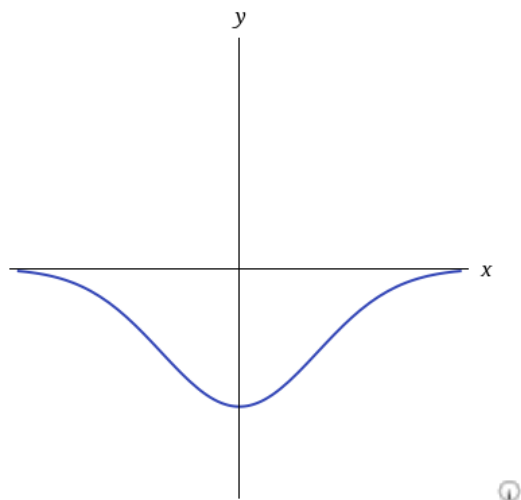
(a)



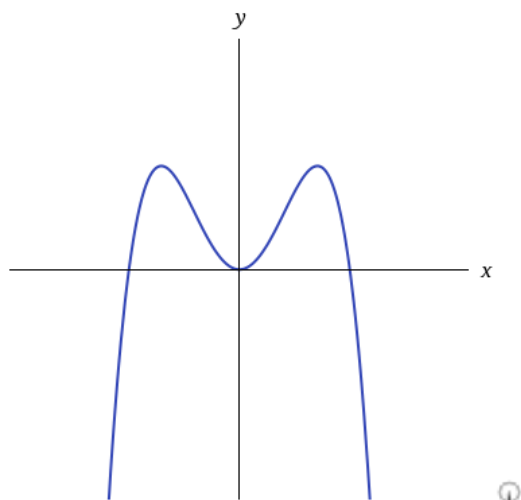
(b)



(c)



(d)

[Click here to begin!](#)

17. [- / 1 Points]

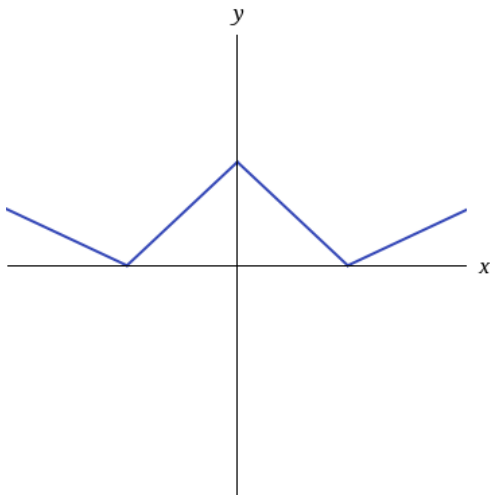
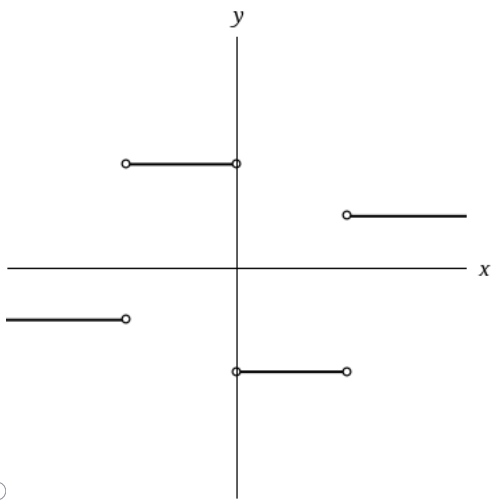
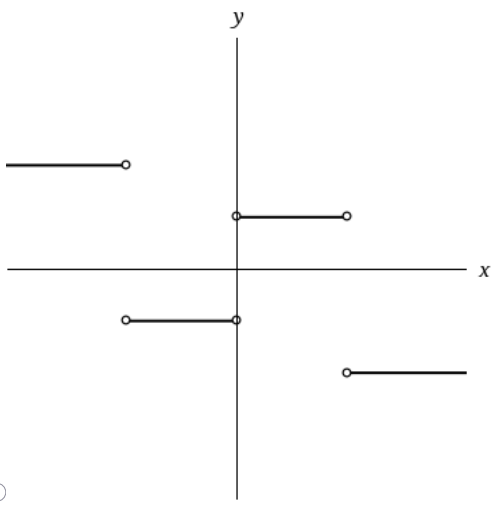
DETAILS

MY NOTES

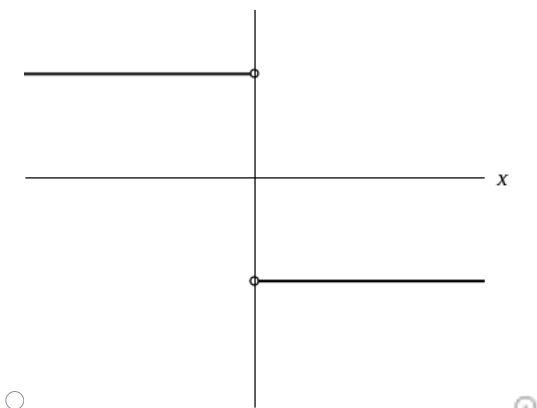
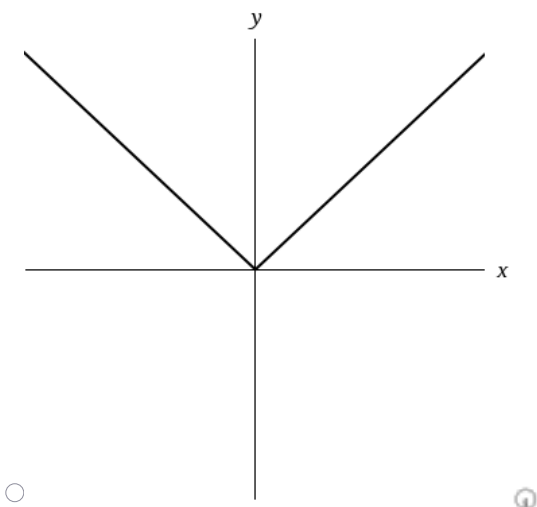
ASK YOUR TEACHER

SCalcCC5 2.7.009.

Trace or copy the graph of the given function f . Assume that the axes have equal scales. Use estimates of the derivative of f to sketch the graph of f' on the same coordinate axes.



y



18. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.7.015.

Oil is leaking from a tank. For $0 \leq t \leq 24$, the number of gallons G in the tank at time t is given by $G(t) = 4,000 - 5t^2$, where t is measured in hours past midnight.

(a) Use the definition of the derivative to find $G'(3)$.

$$G'(3) = \boxed{}$$

(b) Interpret the meaning of $G'(3)$ in the context of this problem. Indicate the units of measure.

- ☐ At 3:00 a.m. the oil is leaking from the tank at a rate of $G'(3)$ hours per gallon.
- ☐ At 3:00 a.m. the oil is leaking from the tank at a rate of $G'(3)$ gallons per hour.
- ☐ At 3:00 a.m. $G'(3)$ gallons of oil have leaked from the tank.
- ☐ At 3:00 a.m. $G'(3)$ gallons of oil are left in the tank.
- ☐ Between 3:00 a.m. and 4:00 a.m. exactly $G'(3)$ gallons of oil will leak from the tank.

19. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.7.024.

Find the derivative of the function using the definition of derivative.

$$f(t) = 5.5t^2 + 8t$$

$$f'(t) = \boxed{}$$

State the domain of the function. (Enter your answer using interval notation.)

State the domain of its derivative. (Enter your answer using interval notation.)

20. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.7.028.

Find the derivative of the function using the definition of derivative.

$$g(x) = \sqrt{6 - x}$$

$$g'(x) =$$

State the domain of the function. (Enter your answer using interval notation.)

State the domain of its derivative. (Enter your answer using interval notation.)

21. [- / 1 Points]

DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.7.043.

Let P represent the percentage of a city's electrical power that is produced by solar panels t years after January 1, 2020.

(a) What does $\frac{dP}{dt}$ represent in this context?

- ☐ dP/dt is the rate at which the time t changes with respect to the city's electrical power produced by solar panels P , measured in years per unit of power.
- ☐ dP/dt is the rate at which the percentage of the city's electrical power produced by solar panels P changes with respect to time t , measured in percentage points per year.
- ☐ dP/dt is the rate at which the time t changes with respect to the percentage of the city's electrical power produced by solar panels P , measured in years per percentage point.
- ☐ dP/dt is the percent of the city's electrical power produced by solar panels P with respect to time t , measured in percentage points.
- ☐ dP/dt is the time t with respect to the percentage of the city's electrical power produced by solar panels P , measured in years.
- ☐ dP/dt is the rate at which the city's electrical power produced by solar panels P changes with respect to time t , measured in units of power per year.

(b) Interpret the following statement.

$$\left. \frac{dP}{dt} \right|_{t=4} = 1.5$$

- ☐ Four years after January 1, 2020, the percentage of electrical power produced by solar panels was increasing at a rate of 1.5 percentage points per year.
- ☐ One and a half years after January 1, 2020, the percentage of electrical power produced by solar panels was increasing at a rate of 4 percentage points per year.
- ☐ One and a half years after January 1, 2020, the percentage of electrical power produced by solar panels was 4 percent.
- ☐ Four years after January 1, 2020, the amount of electrical power produced by solar panels was 1.5 units of power.
- ☐ One and a half years after January 1, 2020, the amount of electrical power produced by solar panels was 1.5 units of power.
- ☐ Four years after January 1, 2020, the percentage of electrical power produced by solar panels was 1.5 percent.

22. [- / 1 Points]

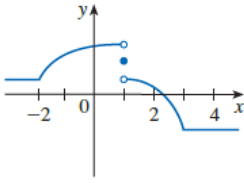
DETAILS

MY NOTES

ASK YOUR TEACHER

SCalcCC5 2.7.048.

The graph of f is given. State the numbers at which f is not differentiable. (Enter your answers as a comma-separated list.)



$x =$

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