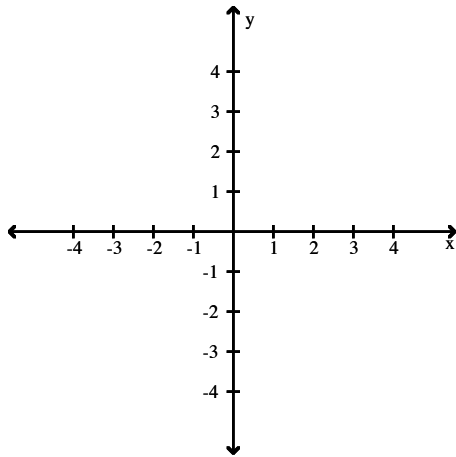


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

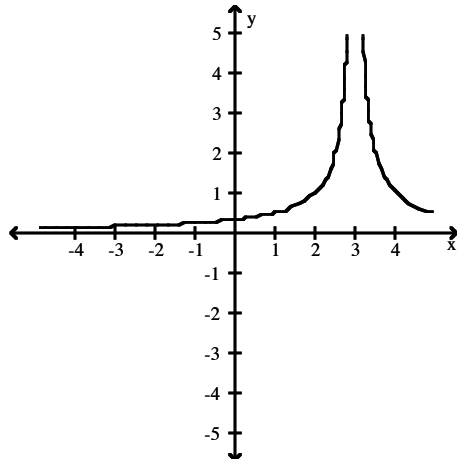
Find the domain and graph the function.

1) $G(t) = \frac{1}{|t-3|}$

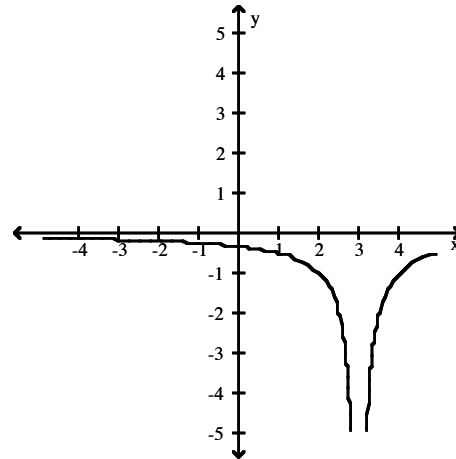
1) _____



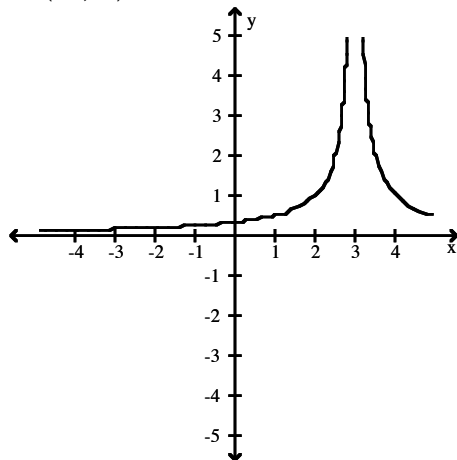
A) $D: (-\infty, 3) \cup (3, \infty)$



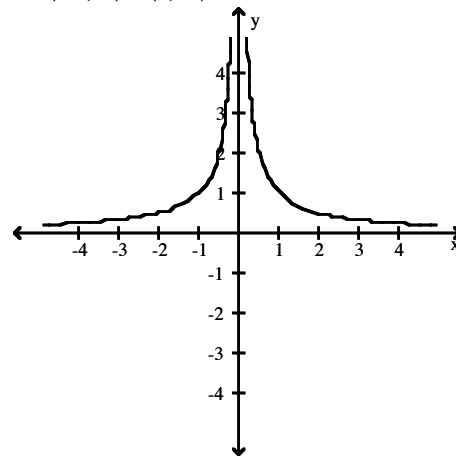
B) $D: (-\infty, 3) \cup (3, \infty)$



C) $D: (-\infty, \infty)$



D) $D: (-\infty, 0) \cup (0, \infty)$



Solve the problem.

2) If $f(x) = \sqrt{x}$, $g(x) = \frac{x}{5}$, and $h(x) = 5x+20$, find $h(g(f(x)))$.

2) _____

A) $\sqrt{x}+4$

B) $\sqrt{x+4}$

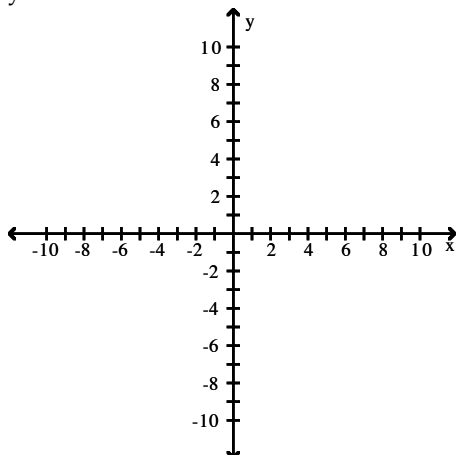
C) $5\sqrt{x}+20$

D) $\sqrt{x}+20$

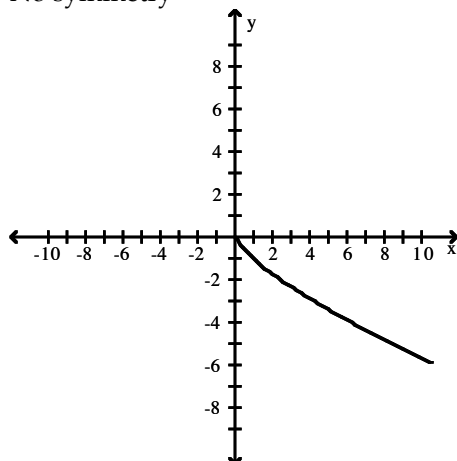
Graph the function. Determine the symmetry, if any, of the function.

3) $y = -x^{4/3}$

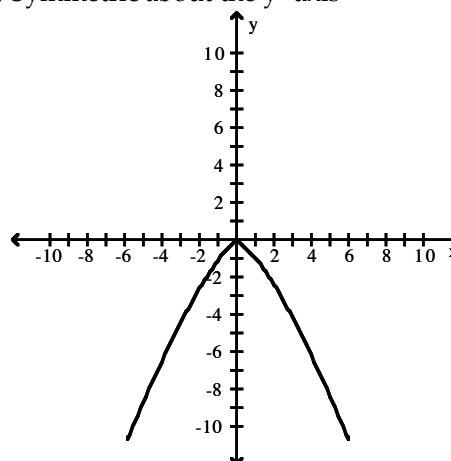
3) _____



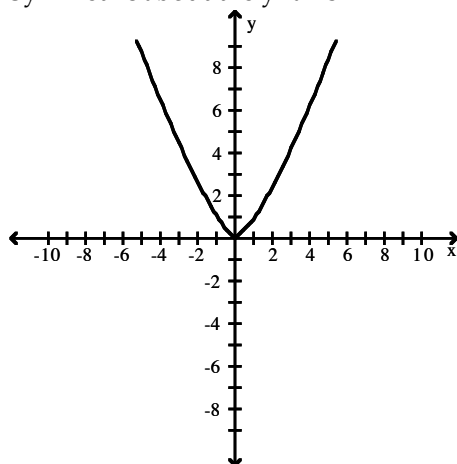
A) No symmetry



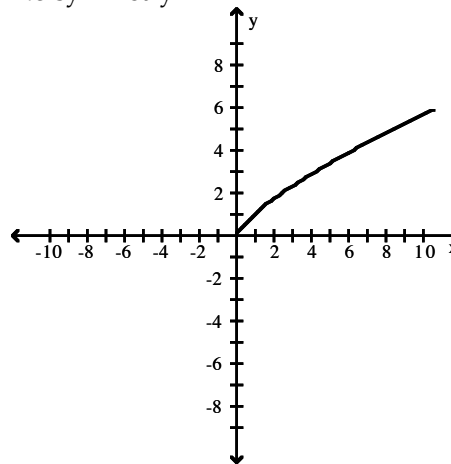
B) Symmetric about the y-axis



C) Symmetric about the y-axis



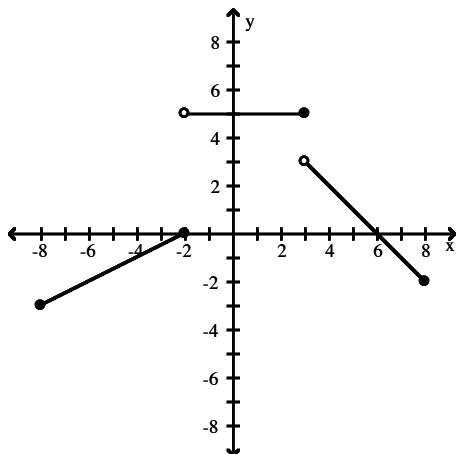
D) No symmetry



Find a formula for the function graphed.

4)

4) _____



$$A) f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 < x \leq -2 \\ 5, & -2 < x \leq 3 \\ 6 - x, & 3 < x < 8 \end{cases}$$

$$B) f(x) = \begin{cases} -\frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x \leq 3 \\ x - 6, & 3 < x \leq 8 \end{cases}$$

$$C) f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x < 3 \\ 6 - x, & 3 \leq x \leq 8 \end{cases}$$

$$D) f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x \leq 3 \\ 6 - x, & 3 < x \leq 8 \end{cases}$$

Solve the equation.

5) $\log x = -4$

5) _____

A) $x = \frac{1}{10,000}$

B) $x = -40$

C) $x = 40$

D) $x = \frac{1}{4^{10}}$

Express as a single logarithm and, if possible, simplify.

6) $\ln(32x + 16) - 2 \ln 4$

6) _____

A) $\ln(4x + 2)$

B) $\ln(32x)$

C) $\ln(256(2x + 1))$

D) $\ln(2x + 1)$

Solve the equation.

7) $2(10 - 2x) = 16$

7) _____

A) $x = 5$

B) $x = 3$

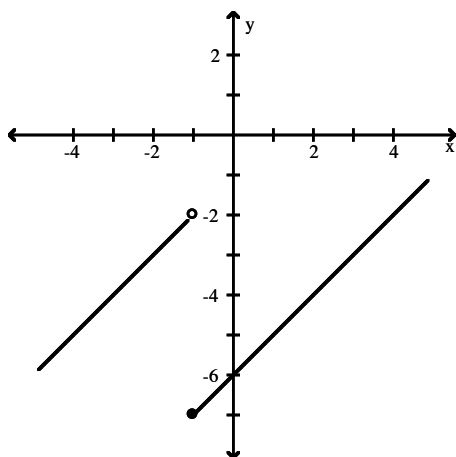
C) $x = 8$

D) $x = -3$

Use the graph to evaluate the limit.

8) Find $\lim_{x \rightarrow (-1)^-} f(x)$ and $\lim_{x \rightarrow (-1)^+} f(x)$

8) _____



A) -5; -2

B) -7; -5

C) -2; -7

D) -7; -2

Give an appropriate answer.

9) Let $\lim_{x \rightarrow -7} f(x) = 2$ and $\lim_{x \rightarrow -7} g(x) = 3$. Find $\lim_{x \rightarrow -7} \left[\frac{8f(x) - 5g(x)}{4 + g(x)} \right]$.

9) _____

A) $\frac{1}{7}$

B) -7

C) $\frac{31}{7}$

D) -1

Determine the limit by sketching an appropriate graph.

10) $\lim_{x \rightarrow -7^+} f(x)$, where $f(x) = \begin{cases} x & -7 \leq x < 0, \text{ or } 0 < x \leq 3 \\ 1 & x = 0 \\ 0 & x < -7 \text{ or } x > 3 \end{cases}$

10) _____

A) 7

B) -0

C) -7

D) Does not exist

Find the limit.

11) $\lim_{x \rightarrow 5} \sqrt{x^2 + 2x + 1}$

11) _____

A) 6

B) 36

C) ± 6

D) does not exist

Find the limit, if it exists.

12) $\lim_{x \rightarrow 9} \frac{|9 - x|}{9 - x}$

12) _____

A) -1

B) 1

C) 0

D) Does not exist

13) $\lim_{h \rightarrow 0} \frac{(x+h)^3 - x^3}{h}$

13) _____

A) 0

B) Does not exist

C) $3x^2 + 3xh + h^2$

D) $3x^2$

Provide an appropriate response.

14) If $x^3 \leq f(x) \leq x$ for x in $[-1,1]$, find $\lim_{x \rightarrow 0} f(x)$ if it exists.

14) _____

A) -1

B) 0

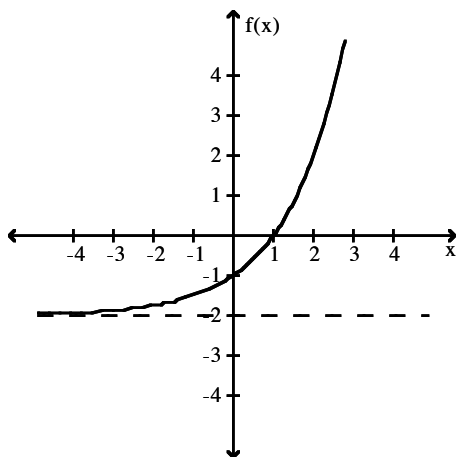
C) 1

D) does not exist

For the function f whose graph is given, determine the limit.

15) Find $\lim_{x \rightarrow \infty} f(x)$.

15) _____



A) does not exist

B) 0

C) ∞

D) -2

Find the limit.

16) $\lim_{x \rightarrow 4^+} \frac{x^2 - 6x + 8}{x^3 - 4x}$

16) _____

A) $-\infty$

B) ∞

C) 0

D) Does not exist

Find all vertical asymptotes of the given function.

17) $f(x) = \frac{-x^2 + 16}{x^2 + 5x + 4}$

17) _____

A) $x = -1$

B) $x = -1, x = -4$

C) $x = 1, x = -4$

D) $x = -1, x = 4$

Divide numerator and denominator by the highest power of x in the denominator to find the limit.

18) $\lim_{x \rightarrow \infty} \frac{5x + 6}{\sqrt{6x^2 + 1}}$

18) _____

A) ∞

B) 0

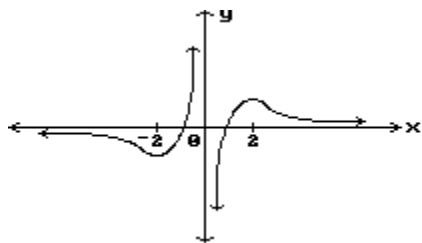
C) $\frac{5}{\sqrt{6}}$

D) $\frac{5}{6}$

Find all points where the function is discontinuous.

19)

19) _____



A) $x = 0$

B) None

C) $x = -2, x = 0, x = 2$

D) $x = -2, x = 2$

Find all horizontal asymptotes of the given function, if any.

20) $f(x) = \frac{4x^4 + x^2 - 2}{x - x^3}$

20) _____

A) $y = -1, y = 1$

B) no horizontal asymptotes

C) $y = -4$

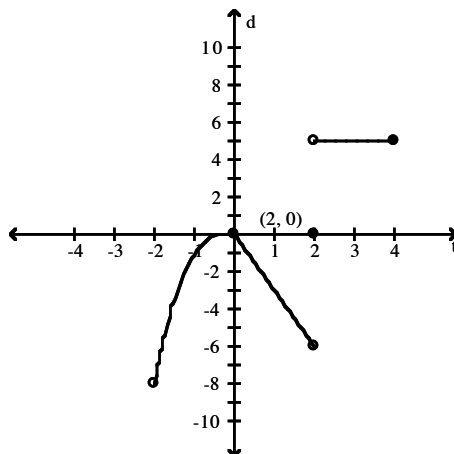
D) $y = 0$

Provide an appropriate response.

21) Is f continuous at $x = 0$?

21) _____

$$f(x) = \begin{cases} x^3, & -2 < x \leq 0 \\ -3x, & 0 \leq x < 2 \\ 5, & 2 < x \leq 4 \\ 0, & x = 2 \end{cases}$$



A) Yes

B) No

Find the limit.

22) $\lim_{x \rightarrow \infty} \frac{9x^3 - 5x^2 + 3x}{-x^3 - 2x + 6}$

22) _____

A) $\frac{3}{2}$

B) 9

C) -9

D) ∞

Find the intervals on which the function is continuous.

23) $y = \frac{3}{x^2 - 25}$

23) _____

- A) discontinuous only when $x = -5$ or $x = 5$
 B) discontinuous only when $x = -5$
 C) discontinuous only when $x = -25$ or $x = 25$
 D) discontinuous only when $x = 25$

Find numbers a and b, or k, so that f is continuous at every point.

24)

24) _____

$$f(x) = \begin{cases} x^2, & x < -5 \\ ax + b, & -5 \leq x \leq -2 \\ x + 6, & x > -2 \end{cases}$$

- A) $a = -7, b = 10$ B) $a = -7, b = -10$ C) $a = 7, b = -10$ D) Impossible

Find the slope of the line tangent to the graph at the given point.

25) $y = \frac{6}{5+x}, x = 7$

25) _____

- A) $m = \frac{1}{2}$ B) $m = \frac{1}{24}$ C) $m = -\frac{1}{24}$ D) $m = -\frac{1}{2}$

Find an equation for the tangent to the curve at the given point.

26) $f(x) = 2\sqrt{x} - x + 5, (4, 5)$

26) _____

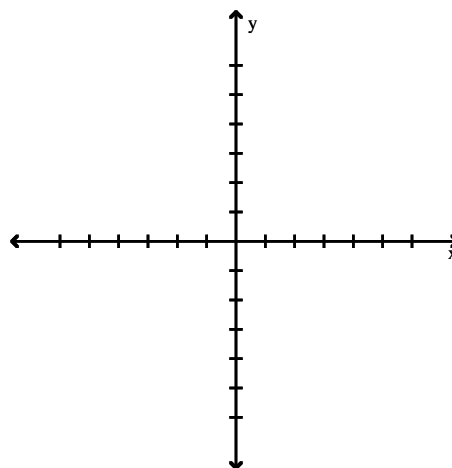
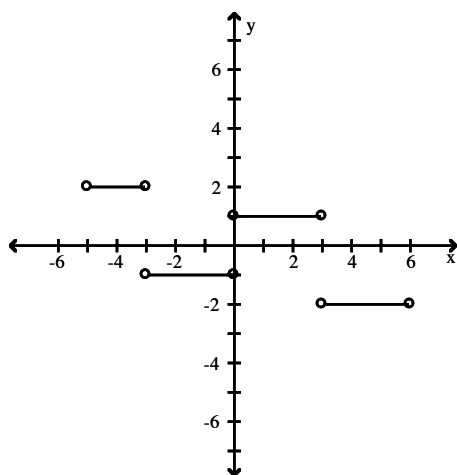
- A) $y = -\frac{1}{2}x + 5$ B) $y = \frac{1}{2}x - 7$ C) $y = 5$ D) $y = -\frac{1}{2}x + 7$

Solve the problem.

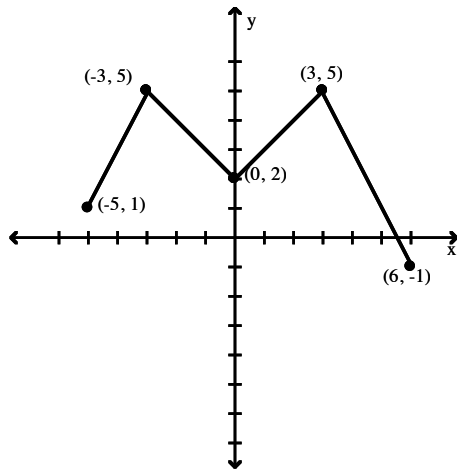
27) Use the following information to graph the function f over the closed interval $[-5, 6]$.

27) _____

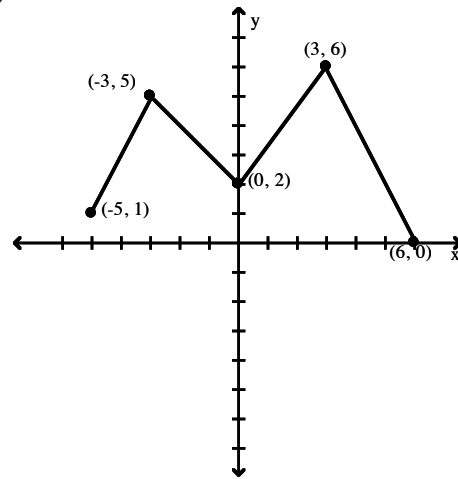
- i) The graph of f is made of closed line segments joined end to end.
 ii) The graph starts at the point $(-5, 1)$.
 iii) The derivative of f is the step function in the figure shown here.



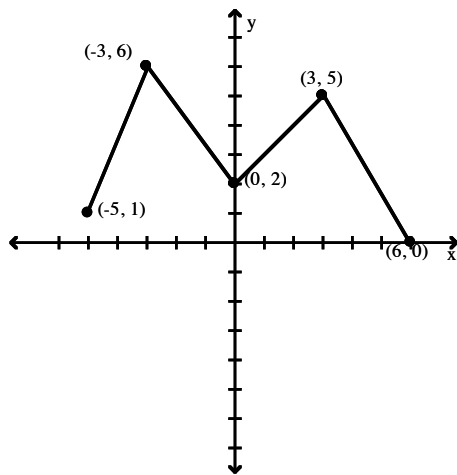
A)



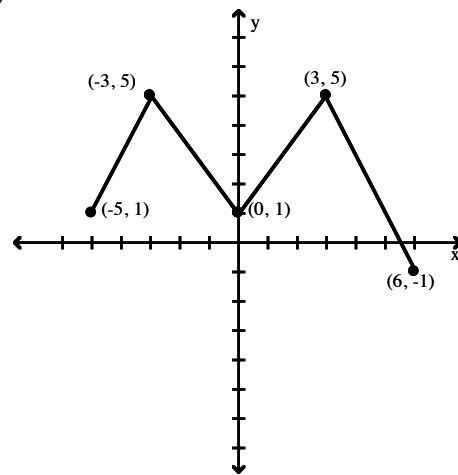
B)



C)



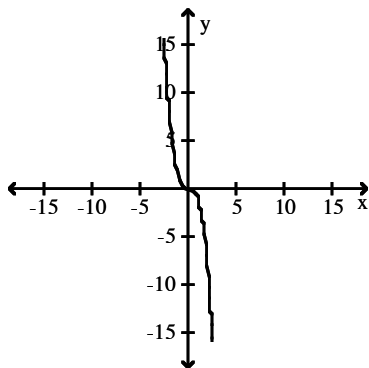
D)



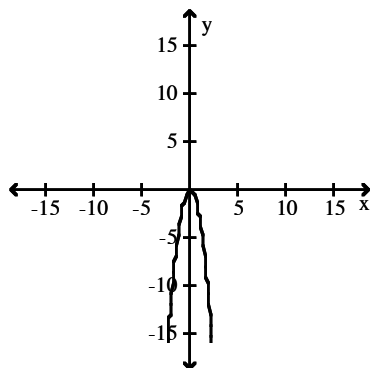
The graph of a function is given. Choose the answer that represents the graph of its derivative.

28)

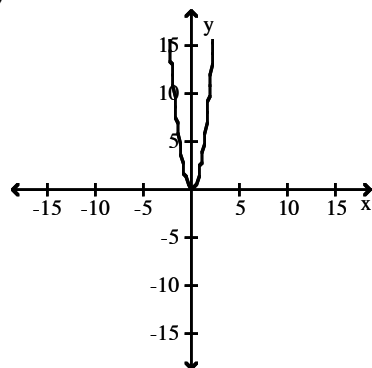
28) _____



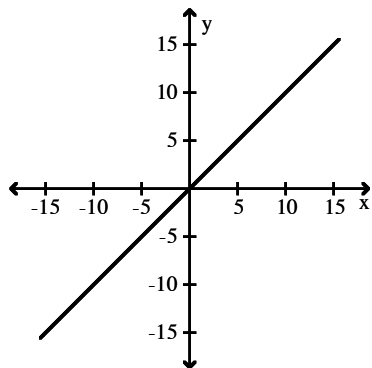
A)



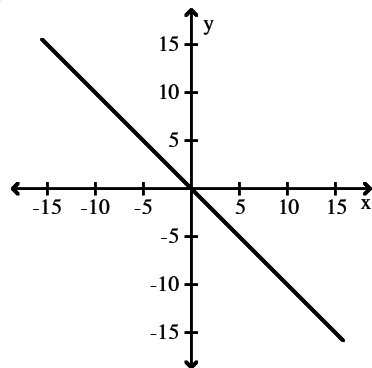
B)



C)



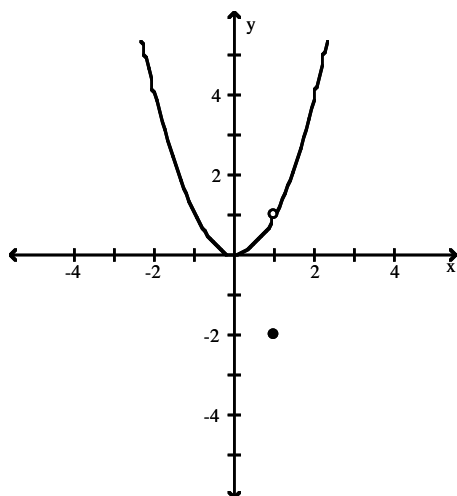
D)



The figure shows the graph of a function. At the given value of x , does the function appear to be differentiable, continuous but not differentiable, or neither continuous nor differentiable?

29) $x = 1$

29) _____



- A) Differentiable
- B) Continuous but not differentiable
- C) Neither continuous nor differentiable

Find the derivative.

30) $y = 4x^2 + 7x + 3e^x$

30) _____

- A) $8x + 3e^x$
- B) $8x + 7 + 3e^x$
- C) $8x + 7 + e^x$
- D) $4x + 3e^x$

Find y' .

31) $y = (2x^3 + 4)(5x^7 - 5)$

31) _____

- A) $100x^9 + 140x^6 - 30x^2$
- B) $8x^9 + 140x^6 - 30x^2$
- C) $8x^9 + 140x^6 - 30x$
- D) $100x^9 + 140x^6 - 30x$

Find an equation of the tangent line at $x = a$.

32) $y = x^3 - 9x + 2$; $a = 3$

32) _____

- A) $y = 20x - 52$
- B) $y = 18x - 52$
- C) $y = 18x + 2$
- D) $y = 2$

Provide an appropriate response.

33) The curves $y = ax^2 + b$ and $y = 2x^2 + cx$ have a common tangent line at the point $(-1, 0)$. Find a , b , and c .

33) _____

- A) $a = 1, b = -1, c = 2$
- B) $a = -2, b = 1, c = -1$
- C) $a = -1, b = 1, c = -2$
- D) $a = 1, b = 0, c = 2$

Find the second derivative.

34) $y = 4x^3 - 7x^2 + 3$

34) _____

- A) $14x - 24$
- B) $24x - 14$
- C) $14x - 16$
- D) $16x - 14$

Suppose u and v are differentiable functions of x . Use the given values of the functions and their derivatives to find the value of the indicated derivative.

35) $u(2) = 8, u'(2) = 3, v(2) = -3, v'(2) = -4.$

35) _____

$\frac{d}{dx}(uv)$ at $x = 2$

A) 36

B) 41

C) -41

D) -23

Find the derivative of the function.

36) $y = \frac{x^2 + 2x - 2}{x^2 - 2x + 2}$

36) _____

A) $y' = \frac{4x^2 + 8x}{(x^2 - 2x + 2)^2}$

B) $y' = \frac{-4x^2 - 8x}{(x^2 - 2x + 2)^2}$

C) $y' = \frac{4x^2 - 8x}{(x^2 - 2x + 2)^2}$

D) $y' = \frac{-4x^2 + 8x}{(x^2 - 2x + 2)^2}$

Find the derivative.

37) $s = \frac{3e^t}{2e^t + 1}$

37) _____

A) $\frac{3e^t}{(2e^t + 1)^3}$

B) $\frac{e^t}{(2e^t + 1)^2}$

C) $\frac{3e^t}{(2e^t + 1)}$

D) $\frac{3e^t}{(2e^t + 1)^2}$

Solve the problem.

38) The size of a population of lions after t months is $P = 100(1 + 0.2t + 0.02t^2)$. Find the growth rate when $P = 2500$.

38) _____

A) 10,020 lions/month

B) 140 lions/month

C) 160 lions/month

D) 180 lions/month

Find the limit.

39) $\lim_{x \rightarrow -\pi/2} 4 \cos \left[\sin x + \pi \cot \left(\frac{\pi}{4 \csc x} \right) + 1 \right]$

39) _____

A) -4

B) 4

C) 1

D) 0

Find the derivative.

40) $s = \sin t - e^{-t}$

40) _____

A) $\frac{ds}{dt} = \cos t + e^{-t}$

B) $\frac{ds}{dt} = -\cos t - e^{-t}$

C) $\frac{ds}{dt} = -\cos t + e^{-t}$

D) $\frac{ds}{dt} = \cos t - e^{-t}$

The equation gives the position $s = f(t)$ of a body moving on a coordinate line (s in meters, t in seconds).

41) $s = 10 \sin t - \cos t$

41) _____

Find the body's acceleration at time $t = \pi/4$ sec.

A) $-\frac{11\sqrt{2}}{2} \text{ m/sec}^2$

B) $\frac{9\sqrt{2}}{2} \text{ m/sec}^2$

C) $\frac{11\sqrt{2}}{2} \text{ m/sec}^2$

D) $-\frac{9\sqrt{2}}{2} \text{ m/sec}^2$

Solve the problem.

42) At time $t \geq 0$, the velocity of a body moving along the s -axis is $v = t^2 - 10t + 9$. When is the body moving backward?

42) _____

A) $t > 9$

B) $0 \leq t < 1$

C) $1 < t < 9$

D) $0 \leq t < 9$

Find the derivative of the function.

43) $h(x) = \left(\frac{\cos x}{1 + \sin x} \right)^6$

43) _____

A) $-6 \left(\frac{\sin x}{\cos x} \right)^5$

B) $\left(-\frac{4 \sin x}{\cos x} \right) \left(\frac{\cos x}{1 + \sin x} \right)^5$

C) $6 \left(\frac{\cos x}{1 + \sin x} \right)^5$

D) $\frac{-6 \cos^5 x}{(1 + \sin x)^6}$

Find dy/dt .

44) $y = \cos(\sqrt{8t+11})$

44) _____

A) $-\sin\left(\frac{4}{\sqrt{8t+11}}\right)$

B) $-\sin(\sqrt{8t+11})$

C) $-\frac{1}{2\sqrt{8t+11}} \sin(\sqrt{8t+11})$

D) $\frac{4}{\sqrt{8t+11}} \sin(\sqrt{8t+11})$

Use implicit differentiation to find dy/dx .

45) $e^{4x} = \sin(x+2y)$

45) _____

A) $\frac{dy}{dx} = \frac{4e^x}{2\sin(x+2y)}$

B) $\frac{dy}{dx} = \frac{8e^x}{\sin(x+2y)}$

C) $\frac{dy}{dx} = -\frac{4e^x}{2\sin(x+2y)}$

D) $\frac{dy}{dx} = \frac{-4e^x}{\sin(x+2y)}$

At the given point, find the slope of the curve or the line that is tangent to the curve, as requested.

46) $x^5y^5 = 32$, tangent at $(2, 1)$

46) _____

A) $y = 16x + 1$

B) $y = -\frac{1}{2}x + 2$

C) $y = 16x - 1$

D) $y = \frac{1}{2}x$

Find the derivative of y with respect to x, t, or θ , as appropriate.

47) $y = \ln(\cos(\ln \theta))$

A) $\tan(\ln \theta)$

B) $-\frac{\tan(\ln \theta)}{\theta}$

C) $-\tan(\ln \theta)$

D) $\frac{\tan(\ln \theta)}{\theta}$

47) _____

Use logarithmic differentiation to find the derivative of y.

48) $y = \frac{x \sin x}{\sqrt{x+4}}$

A) $\frac{1}{2} \left(\frac{1}{x} + \frac{1}{\sin x} + \frac{1}{x+4} \right)$

B) $\frac{1}{x} + \cot x - \frac{1}{2x+8}$

C) $\frac{x \sin x}{\sqrt{x+4}} \left(\ln x + \ln \sin x - \frac{1}{2} \ln(x+4) \right)$

D) $\frac{x \sin x}{\sqrt{x+4}} \left(\frac{1}{x} + \cot x - \frac{1}{2x+8} \right)$

48) _____

Use logarithmic differentiation to find the derivative of y with respect to the independent variable.

49) $y = (\sin x)^{\cos x}$

A) $\cos x \cot x - \ln(\sin x)$

B) $(\sin x)^{\cos x} (\cos x \cot x - \sin x \ln(\sin x))$

C) $\cos x \cot x - \sin x \ln(\sin x)$

D) $\cos x \ln(\sin x)$

49) _____

Find the derivative of y with respect to x.

50) $y = 2 \sin^{-1}(5x^3)$

A) $\frac{30x^2}{\sqrt{1-25x^6}}$

B) $\frac{30x^2}{\sqrt{1-25x^3}}$

C) $\frac{2}{\sqrt{1-25x^6}}$

D) $\frac{30x^2}{1-25x^6}$

50) _____

Solve the problem. Round your answer, if appropriate.

51) The radius of a right circular cylinder is increasing at the rate of 4 in./sec, while the height is decreasing at the rate of 9 in./sec. At what rate is the volume of the cylinder changing when the radius is 6 in. and the height is 12 in.?

A) $252\pi \text{ in.}^3/\text{sec}$

B) $-36\pi \text{ in.}^3/\text{sec}$

C) $-36 \text{ in.}^3/\text{sec}$

D) $-42 \text{ in.}^3/\text{sec}$

51) _____

Answer Key

Testname: 121 PRACTICE MIDTERM

- 1) A
- 2) D
- 3) B
- 4) D
- 5) A
- 6) D
- 7) B
- 8) C
- 9) A
- 10) C
- 11) A
- 12) D
- 13) D
- 14) B
- 15) C
- 16) C
- 17) A
- 18) C
- 19) A
- 20) B
- 21) A
- 22) C
- 23) A
- 24) B
- 25) C
- 26) D
- 27) A
- 28) A
- 29) C
- 30) B
- 31) A
- 32) B
- 33) A
- 34) B
- 35) C
- 36) D
- 37) D
- 38) B
- 39) A
- 40) A
- 41) D
- 42) C
- 43) D
- 44) D
- 45) A
- 46) B
- 47) B
- 48) D
- 49) B

Answer Key

Testname: 121 PRACTICE MIDTERM

50) A

51) A