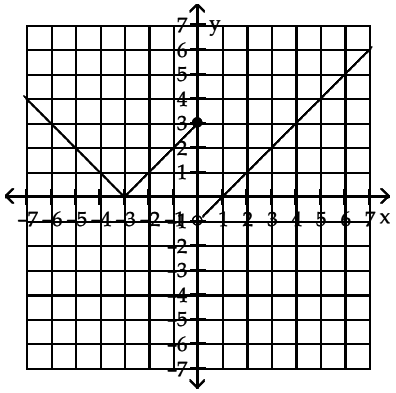
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Decide whether the limit exists. If it exists, find its value.

1) 1)



Find $\lim_{x\to 0^-} f(x)$ and $\lim_{x\to 0^+} f(x)$.

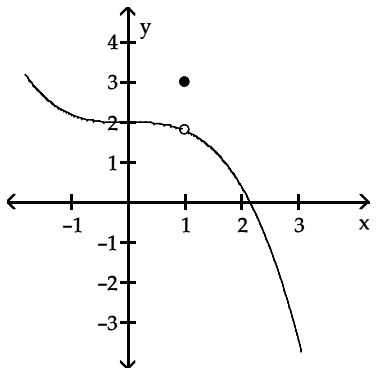
A) –3; –1 B) –1; 3 C) 3; 1 D) 3; –1

Determine the continuity of the function at the given points.

2) 2)

$$f(x) = \begin{cases} 3, & \text{for } x = 1, \\ 2 - \frac{1}{3}x^3, & \text{for } x \neq 1 \end{cases}$$

at $x = 1$ and $x = 2$



A) The function f is continuous at both $x = 2$ and $x = 1$.

B) The function f is continuous at $x = 2$ but not at $x = 1$.

C) The function f is continuous at $x = 1$ but not at $x = 2$.

D) The function f is continuous at neither $x = 2$ nor $x = 1$.

Find the limit, if it exists.

3) $\lim_{x\to 1} \frac{3x^2 + 7x - 2}{3x^2 - 4x - 2}$ 3) _____

A) Does not exist B) $-\frac{8}{3}$ C) $-\frac{7}{4}$ D) 0

4) $\lim_{x \to 3} \sqrt{x^2 + 8x + 16}$ 4) _____

A) 7 B) ±7 C) Does not exist D) 49

5) $\lim_{x \to \infty} \frac{3x - 3x^2 + 4x^3}{6 - 2x - x^3}$ 5) _____

A) 4 B) −4 C) ∞ D) $\frac{3}{2}$

6) $\lim_{x \to -\infty} \frac{2x^3 + 2x^2}{x - 6x^2}$ 6) _____

A) 2 B) ∞ C) $-\frac{1}{3}$ D) −∞

Evaluate or determine that the limit does not exist for each of the limits (a) $\lim_{x \to d-} f(x)$, (b) $\lim_{x \to d+} f(x)$, and (c) $\lim_{x \to d} f(x)$ for the given function f and number d.

7) 7) _____

$$f(x) = \begin{cases} \frac{1}{x+1}, & \text{for } x > -1, \\ x^2 - 2x, & \text{for } x \le -1 \end{cases}$$

d = −1

A) (a) 3
(b) Does not exist
(c) Does not exist

B) (a) 3
(b) Does not exist
(c) 3

C) (a) Does not exist
(b) 3
(c) Does not exist

D) (a) Does not exist
(b) 3
(c) 3

Find the limit, if it exists.

8) $\lim_{x \to 3} \frac{x^2 + 7x - 30}{x - 3}$ 8) _____

A) 13 B) 7 C) Does not exist D) 0

Answer the question.

9) What conditions, when present, are sufficient to conclude that a function f(x) has a limit as x approaches some value of a? 9) _____

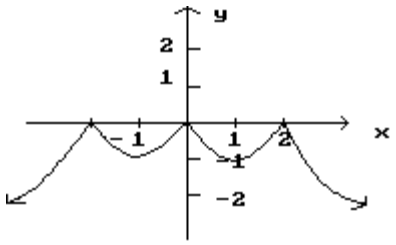
A) The limit of f(x) as x→a from the left exists, the limit of f(x) as x→a from the right exists, and these two limits are the same.

B) f(a) exists, the limit of f(x) as x→a from the left exists, and the limit of f(x) as x→a from the right exists.

C) The limit of f(x) as x→a from the left exists, the limit of f(x) as x→a from the right exists, and at least one of these limits is the same as f(a).

D) Either the limit of f(x) as x→a from the left exists or the limit of f(x) as x→a from the right exists

List the x–values in the graph at which the function is not differentiable.

10) 

10) _____

A) Function is differentiable at all points.
B) x = –2, x = 2
C) x = 0
D) x = –2, x = 0, x = 2

Find the derivative.

11) $f(x) = 9x^{7/5} - 5x^2 + 10^4$ 11) _____

A) $\frac{63}{5}x^{2/5} - 10x$
B) $\frac{63}{5}x^{2/5} - 10x + 4000$
C) $\frac{63}{5}x^{6/5} - 10x + 4000$
D) $\frac{63}{5}x^{6/5} - 10x$

12) $f(x) = 3\sqrt{x} + \sqrt[3]{x} - 2\sqrt[4]{x} + 6\sqrt[5]{x}$ 12) _____

A) $\frac{3}{2}x^{1/2} + \frac{1}{3}x^{2/3} - \frac{1}{2}x^{3/4} + \frac{6}{5}x^{4/5}$
B) $\frac{3}{2}x^{-1/2} + \frac{1}{3}x^{2/3} - \frac{1}{2}x^{3/4} + \frac{6}{5}x^{-4/5}$
C) $\frac{1}{2}x^{-1/2} + \frac{1}{3}x^{-2/3} + \frac{1}{4}x^{-3/4} + \frac{1}{5}x^{-4/5}$
D) $\frac{3}{2}x^{-1/2} + \frac{1}{3}x^{-2/3} - \frac{1}{2}x^{-3/4} + \frac{6}{5}x^{-4/5}$

13) $y = 8x^{-2} + 5x^3 - 8x$ 13) _____

A) $-16x^{-3} + 15x^2 - 8$
B) $-16x^{-3} + 15x^2$
C) $-16x^{-1} + 15x^2$
D) $-16x^{-1} + 15x^2 - 8$

Find $f'(a)$ for the given value of a.

14) $f(x) = -4x^2 + 7x$, a = 5 14) _____

A) 33 B) 3 C) –13 D) –33

15) $f(x) = -8x^{-1} + 5x^{-2}$, a = 2 15) _____

A) $-\frac{3}{4}$ B) $\frac{3}{4}$ C) $\frac{13}{4}$ D) $-\frac{13}{4}$

Given the distance function, s(t), where s is in feet and t is in seconds, find the velocity function, v(t), and the acceleration function, a(t).

16) $s(t) = 3t^2 + t + 10$ 16) _____

A) v(t) = 6t + 1; a(t) = 2
B) v(t) = 6t + 11; a(t) = 6
C) v(t) = 6t + 1; a(t) = 6
D) v(t) = 2t + 1; a(t) = 6

Solve the problem.

17) The profit from the expenditure of x thousand dollars on advertising is given by $P(x) = 740 + 25x - 3x^2$. Find the marginal profit when the expenditure is $x = 20$. 17) _____

A) 380 thousand dollars
B) 500 thousand dollars
C) –95 thousand dollars
D) 740 thousand dollars

Differentiate.

18) $f(x) = (x^2 - 4x + 2)(3x^3 - x^2 + 5)$ 18) _____

A) $f'(x) = 15x^4 - 48x^3 + 30x^2 + 6x - 20$
B) $f'(x) = 3x^4 - 52x^3 + 30x^2 + 6x - 20$
C) $f'(x) = 3x^4 - 48x^3 + 30x^2 + 6x - 20$
D) $f'(x) = 15x^4 - 52x^3 + 30x^2 + 6x - 20$

19) $f(x) = (2x^3 + 3)(5x^7 - 8)$ 19) _____

A) $f'(x) = 8x^9 + 105x^6 - 48x^2$
B) $f'(x) = 100x^9 + 105x^6 - 48x$
C) $f'(x) = 8x^9 + 105x^6 - 48x$
D) $f'(x) = 100x^9 + 105x^6 - 48x^2$

20) $g(x) = \dfrac{x^2}{x - 11}$ 20) _____

A) $g'(x) = \dfrac{x^2}{(x - 11)^2}$ B) $g'(x) = \dfrac{x^2 - 22x}{(x - 11)^2}$ C) $g'(x) = \dfrac{x^2 + 22x}{(x - 11)^2}$ D) $g'(x) = \dfrac{22x}{(x - 11)^2}$

21) $y = \dfrac{x^2 - 3x + 2}{x^7 - 2}$ 21) _____

A) $y' = \dfrac{-5x^8 + 19x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$
B) $y' = \dfrac{-5x^8 + 18x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$
C) $y' = \dfrac{-5x^8 + 18x^7 - 13x^6 - 4x + 6}{(x^7 - 2)^2}$
D) $y' = \dfrac{-5x^8 + 18x^7 - 14x^6 - 3x + 6}{(x^7 - 2)^2}$

Write an equation of the tangent line to the graph of y = f(x) at the point on the graph where x has the indicated value.

22) $f(x) = (-5x^2 + 5x + 2)(-2x - 5)$, $x = 0$ 22) _____

A) $y = -29x - 10$ B) $y = -29x + 10$ C) $y = -\dfrac{1}{29}x + 10$ D) $y = -\dfrac{1}{29}x - 10$

23) $f(x) = \dfrac{-4x^2 - 4}{4x - 1}$, $x = 0$ 23) _____

A) $y = -16x + 4$ B) $y = 16x - 4$ C) $y = 16x + 4$ D) $y = -16x - 4$

Differentiate.

24) $g(x) = \left(6x^4 + 7x + \frac{3}{x^2}\right)^{9/5}$ 24) _____

A) $g'(x) = \frac{9}{5}\left(6x^4 + 7x + \frac{3}{x^2}\right)^{4/5}$

B) $g'(x) = \frac{9}{5}\left(6x^4 + 7x + \frac{3}{x^2}\right)^{4/5}\left(24x^3 + 7 - \frac{6}{x^3}\right)$

C) $g'(x) = \frac{9}{5}\left(6x^4 + 7x + \frac{3}{x^2}\right)^{4/5}\left(24x^3 + 7 - \frac{6}{x}\right)$

D) $g'(x) = \frac{9}{5}\left(24x^3 + 7 - \frac{6}{x^3}\right)^{4/5}$

Find $\frac{d^2y}{dx^2}$.

25) $y = 6x^4 - 6x^2 + 2$ 25) _____

A) $24x^2 - 12x$ B) $72x^2 - 12x$ C) $24x^2 - 12$ D) $72x^2 - 12$

Find the derivative of the function.

26) $y = \ln(7 + x^2)$ 26) _____

A) $\frac{1}{2x + 7}$ B) $\frac{14}{x}$ C) $\frac{2}{x}$ D) $\frac{2x}{x^2 + 7}$

27) $y = \ln(\ln 7x)$ 27) _____

A) $\frac{1}{7x}$ B) $\frac{1}{\ln 7x}$ C) $\frac{1}{x}$ D) $\frac{1}{x \ln 7x}$

Differentiate.

28) $f(x) = -4e^{7x}$ 28) _____

A) $-28e^{7x}$ B) $-28e^{x}$ C) $-4e^{7x}$ D) $7e^{7x}$

29) $y = e^{6 - 9x}$ 29) _____

A) $6e^{6 - 9x}$ B) e^{-9} C) $-9e^{6 - 9x}$ D) $-9 \ln(6 - 9x)$

Find the derivative of the function.

30) $y = \ln(8 + x^2)$ 30) _____

A) $\frac{2x}{x^2 + 8}$ B) $\frac{1}{2x + 8}$ C) $\frac{16}{x}$ D) $\frac{2}{x}$

Answer the question.

31) Suppose that y is a function of u, and that u is itself a function of x. How does one find the derivative of y in terms of x? 31) _____

A) The sum rule: $\frac{d(y + u)}{dx} = \frac{dy}{dx} + \frac{du}{dx}$

B) The difference rule: $\frac{d(y - u)}{dx} = \frac{dy}{dx} - \frac{du}{dx}$

C) The product rule: $\frac{d(y \cdot u)}{dx} = y \cdot \frac{du}{dx} + u \cdot \frac{dy}{dx}$

D) The chain rule: $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$

Find the relative extrema of the function, if they exist.

32) $f(x) = x^3 - 12x + 2$ 32) _____

A) (2, –14), (–2, 18) B) None

C) (0, 0) D) (–2, 18), (0, 0), (2, –14)

33) $f(x) = 3x^4 + 16x^3 + 24x^2 + 32$ 33) _____

A) (–2, 32) B) (–2, 48), (0, 32) C) (2, 48) D) (–2, 32), (0, 32)

34) $f(x) = \frac{1}{x^2 - 1}$ 34) _____

A) (1, 0), (–1, 0) B) None

C) (1, 0), (0, –1), (–1, 0) D) (0, –1)

Find the points of inflection.

35) $f(x) = x^3 + 3x^2 - x - 24$ 35) _____

A) (1, 8) B) (–1, 3) C) (–1, –21) D) (–1, 0)

36) $f(x) = \frac{2}{3}x^3 - 6x^2 + x$ 36) _____

A) (3, –33) B) (–3, –17) C) (3, –17) D) (3, 0)

Solve the problem.

37) The annual revenue and cost functions for a manufacturer of precision gauges are approximately $R(x) = 500x - 0.01x^2$ and $C(x) = 120x + 100{,}000$, where x denotes the number of gauges made. What is the maximum annual profit? 37) _____

A) $3,610,000 B) $3,710,000 C) $3,810,000 D) $3,510,000

Find the absolute maximum and absolute minimum values of the function, if they exist, on the indicated interval.

38) $f(x) = x^3 - 3x - 2; [-5, 1]$ 38) _____

A) Absolute minimum: –6

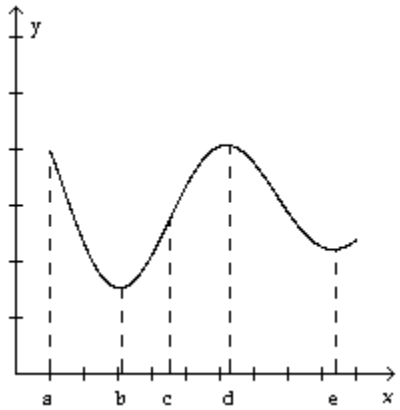
B) Absolute maximum: –4, absolute minimum: –6

C) Absolute maximum: 0, absolute minimum: –112

D) Absolute maximum: 0

Answer the question.

39) Consider this graph. 39) _____



Determine which points on the graph are critical points and describe why each of the points is a critical point.

A) Since the point at x = a is the only one for which the first derivative does not exist, this is the only critical point.

B) The only critical points are those at x = b, d, and e, because the derivative is zero only at these points.

C) The points on the function at x = a, b, d, and e are critical points, because the derivative is zero at each of these points.

D) The points on the function at x = a, b, d, and e are critical points, because at x = a the first derivative does not exist and at x = b, d, and e the derivative is zero.

Solve the problem.

40) An architect needs to design a rectangular room with an area of 81 ft^2. What dimensions should he use in order to minimize the perimeter? Round to the nearest hundredth, if necessary. 40) _____

A) 16.2 ft x 81 ft B) 20.25 ft x 20.25 ft C) 9 ft x 9 ft D) 9 ft x 20.25 ft

41) If the price charged for a candy bar is p(x) cents, then x thousand candy bars will be sold in a certain city, where $p(x) = 88 - \frac{x}{16}$. How many candy bars must be sold to maximize revenue? 41) _____

A) 1408 candy bars B) 1408 thousand candy bars

C) 704 candy bars D) 704 thousand candy bars

Find dy/dx by implicit differentiation.

42) $xy^2 = 4$ 42) _____

A) $\frac{x}{2y}$ B) $\frac{2x}{y}$ C) $-\frac{y}{2x}$ D) $-\frac{2y}{x}$

Solve the problem.

43) Water is falling on a surface, wetting a circular area that is expanding at a rate of 10 mm^2/s. How fast is the radius of the wetted area expanding when the radius is 123 mm? (Round approximations to four decimal places.) 43) _____

A) 0.0129 mm/s B) 0.0813 mm/s C) 77.2831 mm/s D) 0.0259 mm/s

Find the elasticity of the demand function at the given price and state whether the demand is elastic, inelastic, or whether it has unit elasticity.

44) $x = D(p) = 800 - 4p$; \$43 44) _____

A) 628; elastic B) $\frac{43}{157}$; elastic C) $\frac{1}{157}$; inelastic D) $\frac{157}{43}$; inelastic

Evaluate.

45) $\int (4x^{11} - 7x^3 + 4)\, dx$ 45) _____

A) $\frac{1}{3}x^{12} - \frac{7}{4}x^4 + 4x + C$ B) $\frac{1}{4}x^{12} - \frac{7}{3}x^4 + 4x + C$

C) $12x^{12} - \frac{7}{4}x^4 + 4x + C$ D) $12x^{12} - \frac{7}{3}x^4 + 4x + C$

Find f such that the given conditions are satisfied.

46) $f'(x) = x^2 + 6$, $f(3) = 55$ 46) _____

A) $f(x) = \frac{x^3}{3} + 6x$ B) $f(x) = \frac{x^3}{3} + 6x + 28$

C) $f(x) = x^3 + 6x + 10$ D) $f(x) = x^3 + 6x^2 + 28$

Evaluate the indefinite integral.

47) $\int \frac{x^4 - 5x + 7}{x^2}\, dx$ 47) _____

A) $\frac{x^3}{3} + \frac{5}{x^2} - \frac{14}{x^3} + C$ B) $\frac{x^3}{3} - 5\ln|x| - \frac{7}{x} + C$

C) $\frac{x^3}{3} - \frac{5}{2}x^2 - \frac{7}{x} + C$ D) $x^3 - 5\ln|x| + \frac{7}{x} + C$

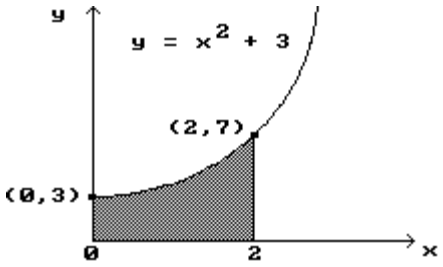
Solve the problem.

48) Find: $\int \left[5e^x - \frac{1}{x}\right] dx$ 48) _____

A) $5e^x - \frac{2}{x^2} + C$ B) $5e^x - \frac{1}{2x^2} + C$ C) $5e^x - \ln|x| + C$ D) $5xe^x - \ln|x| + C$

Find the shaded area under the given curve.

49) 49) _____



A) $\frac{23}{3}$ B) $\frac{25}{3}$ C) $\frac{22}{3}$ D) $\frac{26}{3}$

Solve the problem.

50) Find the area bounded by $f(x) = x^2 - 1$ and $g(x) = 2x + 2$ (Round answer to two decimal places, if necessary.) 50) _____

A) 13.33 B) 5.33 C) 2.67 D) 10.67

Find the average value over the given interval.

51) $y = x^2 - 4x + 3$; [0, 4] 51) _____

A) – 1 B) $\frac{1}{3}$ C) 3 D) $\frac{28}{3}$

Solve the problem.

52) Suppose the supply function of a certain item is given by $p=S(q) = 50 + \frac{2}{3}q^2$ and the demand 52) _____

function is $p=D(q) = 131 - \frac{1}{3}q^2$. Find the consumer's surplus at the equilibrium price level.

A) \$220 B) \$104 C) \$324 D) \$162

Answer Key
Testname: PRACTICE 160 FINAL S2005

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

51) B
52) D