Chapter 2 Review

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

Solve the problem.

1) Assume that a watermelon dropped from a tall building falls $y = 16t^2$ ft in t sec. Find the watermelon's average speed during the first 6 sec of fall. 1) _____

A) 96 ft/sec B) 97 ft/sec C) 192 ft/sec D) 48 ft/sec

Determine the limit by substitution.

2) $\lim_{x \to 0} (x^2 - 5)$ 2) _____

A) 5 B) 0 C) −5 D) Does not exist

3) $\lim_{x \to 0} \frac{x^3 - 6x + 8}{x - 2}$ 3) _____

A) −4 B) Does not exist C) 4 D) 0

Determine the limit algebraically, if it exists.

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

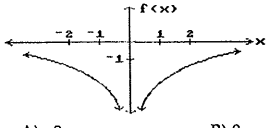
A) 0 B) 6 C) −6 D) Does not exist

5) $\lim_{x \to 0} \frac{6 \sin x}{7x}$ 5) _____

A) $\frac{6}{7}$ B) Does not exist C) 1 D) 0

Determine the limit graphically, if it exists.

6) $\lim_{x \to 0} f(x)$ 6) _____



A) −2 B) 0 C) 2 D) Does not exist

Find the vertical asymptotes of the graph of f(x).

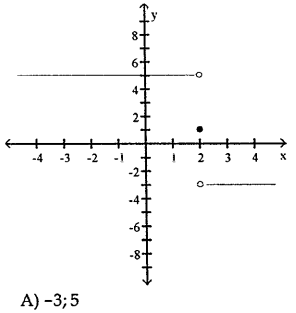
7) $f(x) = \sec x$ 7) _____

A) $x = \frac{\pi}{2} + n\pi$, n is any integer B) $x = \pi$

C) $x = 0$ D) $x = n\pi$, n is any integer

Determine the limit graphically, if it exists.

8) Find $\lim_{x \to 2^-} f(x)$ and $\lim_{x \to 2^+} f(x)$. 8) _____



A) −3; 5 B) 5; −3

C) Does not exist; does not exist D) 1; 1

Find the limit.

9) Let $\lim_{x \to 6} f(x) = -7$ and $\lim_{x \to 6} g(x) = -8$. Find $\lim_{x \to 6} \frac{-7f(x) - 6g(x)}{-3 + g(x)}$ 9) _____

A) $-\frac{67}{3}$ B) 6 C) $-\frac{97}{11}$ D) $-\frac{1}{11}$

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.

10) 10) _____

$$f(x) = \begin{cases} -2x - 2, & \text{for } x < 1, \\ 1, & \text{for } x = 1, \\ -4x + 8, & \text{for } x > 1 \end{cases}$$

d = 1

A) (a) 4
(b) −4
(c) 0

B) (a) −4
(b) 4
(c) Does not exist

C) (a) 4
(b) −4
(c) Does not exist

D) (a) −4
(b) 4
(c) 0

Find the points of discontinuity. Identify each type of discontinuity.

11) $y = e^{1/x}$ 11) _____

A) x = 1, infinite discontinuity B) None

C) x = −1, infinite discontinuity D) x = 0, infinite discontinuity

Find the limit of f(x) as (a) $x \to -\infty$, (b) $x \to \infty$, (c) $x \to 0^-$, and (d) $x \to 0^+$.

12) $f(x) = \begin{cases} \frac{x-4}{x-2}, & x \le 0 \\ \frac{1}{x^2}, & x > 0 \end{cases}$ 12) _____

A) (a) ∞
(b) 2
(c) 0
(d) 1

B) (a) 1
(b) 0
(c) 2
(d) ∞

C) (a) 2
(b) Does not exist
(c) 1
(d) 0

D) (a) $-\infty$
(b) ∞
(c) 4
(d) 2

Find the vertical asymptotes of the graph of f(x).

13) $f(x) = \frac{1}{x^2 - 16}$ 13) _____

A) $x = -4$
B) $x = 4$
C) $x = -4$ and $x = 4$
D) no vertical asymptotes

Find the points of discontinuity. Identify each type of discontinuity.

14) $y = \frac{3}{(x+5)^2 + 10}$ 14) _____

A) $x = -5$, infinite discontinuity
B) None
C) $x = -5$, jump discontinuity
D) $x = 35$

15) $y = \sqrt{4x + 5}$ 15) _____

A) $x > -\frac{5}{4}$, all points not in the domain
B) $x < -\frac{5}{4}$, all points not in the domain
C) $x = -\frac{5}{4}$, jump discontinuity
D) $x = -\frac{5}{4}$, infinite discontinuity

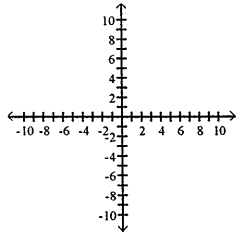
Provide an appropriate response.

16) Given $f(x) = x + 2$ and $g(x) = x - 7$, where is the function $f(x)/g(x)$ continuous? 16) _____
A) The function $f(x)/g(x)$ is continuous for all x except $x = 7$.
B) The function $f(x)/g(x)$ is continuous for all x except $x = -2$.
C) The function $f(x)/g(x)$ is continuous for all x.
D) The function $f(x)/g(x)$ is continuous for all x except $x = -2$ and $x = 7$.

17) Decide whether the function $f(x) = x^2 + 6x - 8$ is continuous for all x, and provide a short statement supporting your conclusion. 17) _____
A) No, there is a break in the graph of this function at $x = 0$.
B) No, this polynomial is not defined for all x.
C) Yes, polynomial functions are continuous; there are no breaks in the graph of a polynomial function.
D) Yes, polynomial functions are defined for all x.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

18) A function $y = f(x)$ is continuous on [2, 6]. It is known to be positive at $x = 2$ and negative at $x = 6$. What, if anything, does this indicate about the equation $f(x) = 0$? Illustrate with a sketch. 18) _____



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

Solve the problem.

19) Find the points where the graph of the function has horizontal tangents. 19) _____
$f(x) = 4x^2 + 4x - 4$
A) $\left(\frac{1}{2}, -18\right)$
B) (0, 4)
C) $\left(-\frac{1}{2}, -5\right)$
D) (-12, 716)

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

20) $f(x) = \frac{4}{x+3}$ at $x = 4$ 20) _____
A) $y = \frac{4}{49}x + \frac{12}{49}$
B) $y = -\frac{8}{49}x + \frac{44}{49}$
C) $y = -\frac{4}{49}x + \frac{12}{49}$
D) $y = -\frac{4}{49}x + \frac{44}{49}$

Solve the problem.

21) For a motorcycle traveling at speed v (in mph) when the brakes are applied, the distance d (in feet) required to stop the motorcycle may be approximated by the formula $d = 0.05v^2 + v$. Find the instantaneous rate of change of distance with respect to velocity when the speed is 42 mph. 21) _____
A) 10.4 mph
B) 5.2 mph
C) 43 mph
D) 4.2 mph

Find the equation of the normal line to the indicated curve at the given point.

22) $y = 3x^2$ at (3, 27) 22) _____
A) $x + 18y - 489 = 0$
B) $x + 18y - 483 = 0$
C) $x - 18y + 483 = 0$
D) $x + 18y + 483 = 0$

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

23) $f(x) = x^2 + 4$ at $x = 4$ 23) _____
A) $y = 8x - 28$
B) $y = 8x - 24$
C) $y = 8x - 12$
D) $y = 4x - 12$