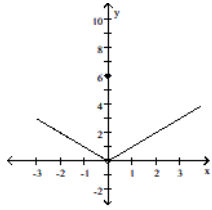


Practice 2, Business Calculus

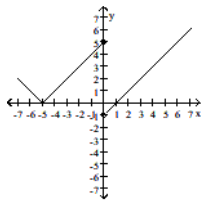
Broward College

Use the graph to evaluate the indicated limit and function value or state that it does not exist.

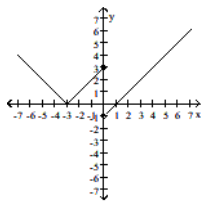
- 1) Find $\lim_{x \rightarrow 0} f(x)$ and $f(0)$.



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



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



Find the limit, if it exists.

4) Find: $\lim_{x \rightarrow -1} \frac{6x + 5}{5x - 6}$

4) _____

A) 1

B) -11

C) $-\frac{1}{11}$

D) $\frac{1}{11}$

5) Given $\lim_{x \rightarrow 4} f(x) = -2$ and $\lim_{x \rightarrow 4} g(x) = 5$, find $\lim_{x \rightarrow 4} \frac{[g(x) - f(x)]}{-4 f(x)}$.

5) _____

A) $\frac{7}{8}$

B) $-\frac{3}{8}$

C) $\frac{3}{8}$

D) $-\frac{7}{8}$

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

6) _____

A) 16

B) -8

C) 8

D) -24

7) Find: $\lim_{x \rightarrow 5} \frac{x - 5}{|x - 5|}$

7) _____

A) 1

B) 0

C) -1

D) Does not exist

8) Find: $\lim_{x \rightarrow 3} \left(\frac{x^2 - 9}{x - 3} + \sqrt{x^2 + 7} \right)$

8) _____

A) 3

B) 2

C) 10

D) Does not exist

9) Find: $\lim_{x \rightarrow 3} \frac{x - 3}{x^2 - 3x}$

9) _____

A) $-\frac{1}{3}$

B) 0

C) $\frac{1}{3}$

D) Does not exist

10) Let $f(x) = \begin{cases} \frac{x^2 - 16}{x + 4} & \text{if } x > 0 \\ \frac{x^2 - 16}{x - 4} & \text{if } x < 0 \end{cases}$

10) _____

Find $\lim_{x \rightarrow 0^-} f(x)$.

A) 4

B) ∞

C) -4

D) Does not exist

11) Let $f(x) = \begin{cases} \frac{x^2 - 16}{x + 4} & \text{if } x > 0 \\ \frac{x^2 - 16}{x - 4} & \text{if } x < 0 \end{cases}$

11) _____

Find $\lim_{x \rightarrow 0^+} f(x)$

A) 0

B) -4

C) 4

D) Does not exist

12) Evaluate the following limit.

$$\lim_{x \rightarrow 2^+} \frac{1}{x - 2}$$

- A) 2 B) ∞ C) $-\infty$ D) Does not exist

12) _____

13) Find: $\lim_{h \rightarrow 0} \frac{f(7+h) - f(7)}{h}$ for $f(x) = -x + 1$.

- A) 1 B) -1 C) 0 D) Does not exist

13) _____

Solve the problem.

14) A company training program determines that, on average, a new employee can do $P(x)$ pieces of work per day after s days of on-the-job training, where $P(x) = \frac{60x}{x+5}$. Find $\lim_{x \rightarrow 5} P(x)$.

- A) 105 B) 30 C) 42 D) Does not exist

14) _____

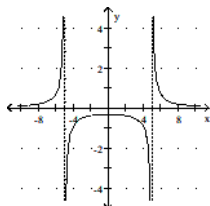
15) The cost of manufacturing a particular videotape is $C(x) = 9000 + 9x$, where x is the number of tapes produced. The average cost per tape, denoted by $\bar{C}(x)$, is found by dividing $C(x)$ by x . Find $\lim_{x \rightarrow 9000} \bar{C}(x)$.

- A) 6 B) 14 C) 10 D) Does not exist

15) _____

Use the given graph to find the indicated limit.

16)

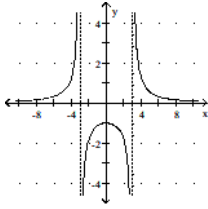


$$\lim_{x \rightarrow 5^+} f(x)$$

- A) 0 B) ∞ C) 5 D) $-\infty$

16) _____

17)



17) _____

$$\lim_{x \rightarrow 3^-} f(x)$$

$$x \rightarrow 3^-$$

A) ∞

B) 0

C) $-\infty$

D) 3

Find the limit.

18) Determine the limit.

$$\lim_{x \rightarrow -10^-} f(x), \text{ where } f(x) = \frac{1}{x+10}$$

A) 0

B) -1

C) ∞

D) $-\infty$

18) _____

19) Determine the limit.

$$\lim_{x \rightarrow 5^+} f(x), \text{ where } f(x) = \frac{x^2}{(x-5)^3}$$

A) -2

B) 5

C) ∞

D) $-\infty$

19) _____

Provide an appropriate response.

20) If the limit at infinity exists, find the limit.

$$\lim_{x \rightarrow \infty} \frac{5x^2 + 7x - 9}{-6x^2 + 2}$$

A) $-\frac{2}{9}$

B) 0

C) ∞

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

20) _____

21) If the limit at infinity exists, find the limit.

$$\lim_{x \rightarrow \infty} \frac{3x^3 + 5x}{4x^4 + 10x^3 + 2}$$

A) 0

B) ∞

C) $\frac{3}{4}$

D) 1

21) _____

Use ∞ or $-\infty$ where appropriate to describe the behavior at each zero of the denominator and identify all vertical asymptotes.

22) $f(x) = \frac{x^2 - 16}{x^2 + 16}$ 22) _____

- A) $\lim_{x \rightarrow 4^-} f(x) = \infty$; $\lim_{x \rightarrow 4^+} f(x) = \infty$; $x = 0$ is a vertical asymptote
 B) $\lim_{x \rightarrow 4^-} f(x) = \infty$; $\lim_{x \rightarrow 4^+} f(x) = \infty$; $x = 4$ is a vertical asymptote
 C) No zeros of denominator; no vertical asymptotes
 D) $\lim_{x \rightarrow -4^-} f(x) = \infty$; $\lim_{x \rightarrow -4^+} f(x) = \infty$; $x = -4$ is a vertical asymptote

Describe the end behavior of the function.

23) $f(x) = 5x^4 + 5x + 11$ 23) _____

- A) $\lim_{x \rightarrow \infty} f(x) = -\infty$; $\lim_{x \rightarrow -\infty} f(x) = -\infty$
 B) $\lim_{x \rightarrow \infty} f(x) = \infty$; $\lim_{x \rightarrow -\infty} f(x) = -\infty$
 C) $\lim_{x \rightarrow \infty} f(x) = -\infty$; $\lim_{x \rightarrow -\infty} f(x) = \infty$
 D) $\lim_{x \rightarrow \infty} f(x) = \infty$; $\lim_{x \rightarrow -\infty} f(x) = \infty$

Provide an appropriate response.

24) Find the vertical asymptote(s) of the graph of the given function. 24) _____

$$f(x) = \frac{3x - 9}{5x + 30}$$

- A) $x = -8$ B) $y = 8$ C) $y = -3$ D) $x = -6$

25) Find the vertical asymptote(s) of the graph of the given function. 25) _____

$$f(x) = \frac{x^2 - 100}{(x - 9)(x + 3)}$$

- A) $x = 9, x = -3$ B) $y = 9, y = -3$ C) $x = -9$ D) $x = 10, x = -10$

26) Find the horizontal asymptote, if any, of the given function. 26) _____

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

- A) $y = 3, y = -4$ B) $x = 2, x = -2$ C) $y = 1$ D) None

27) Find the horizontal asymptote, if any, of the given function. 27) _____

$$f(x) = \frac{2x^3 - 3x - 9}{9x^3 - 5x + 3}$$

- A) $y = \frac{3}{5}$ B) $y = 0$ C) $y = \frac{2}{9}$ D) None

Solve the problem.

28) Suppose that the value V of a certain product decreases, or depreciates, with time t , in months, when $t \rightarrow \infty$ _____

$$V(t) = 23 - \frac{16t^2}{(t+2)^2}$$

Find $\lim_{t \rightarrow \infty} V(t)$.

- A) 19 B) 23 C) 7 D) 16

29) Suppose that the value V of a certain product decreases, or depreciates, with time t , in months, when $t \rightarrow \infty$ _____

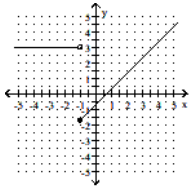
$$V(t) = 100 - \frac{30t^2}{(t+2)^2}$$

Find $\lim_{t \rightarrow \infty} V(t)$.

- A) 30 B) 70 C) 100 D) 85

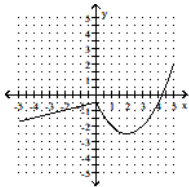
The graph of $y = f(x)$ is shown. Use the graph to answer the question.

30) Is f continuous at $x = -1$? 30) _____



- A) No B) Yes

31) Is f continuous at $x = 2$?



Provide an appropriate response.

32) Determine where the function $H(x) = \frac{x^2 + 7}{x^2 + x - 6}$ is continuous. 32) _____

- A) $(-3, 2) \cup (2, \infty)$ B) $(-\infty, -3) \cup (-3, 2) \cup (2, \infty)$
 C) $(-\infty, -3) \cup (-3, 2)$ D) $(-\infty, -3)$

33) Determine the x-values, if any, at which the function is discontinuous. 33) _____

$$h(x) = \begin{cases} x^2 - 9 & \text{for } x < -1 \\ 0 & \text{for } -1 \leq x \leq 1 \\ x^2 + 9 & \text{for } x > 1 \end{cases}$$

- A) -1, 1 B) 1 C) -1, 0, 1 D) None

34) Solve the inequality and express the answer in interval notation: $\frac{x^2 - 4x}{x + 5} > 0$. 34) _____

- A) (-5, 0) B) (-5, ∞) C) (-5, 0) \cup (4, ∞) D) (4, ∞)

35) Use a sign chart to solve the inequality. Express answers in interval notation. 35) _____

$$x^2 > 16$$

- A) (-4, 4) B) (4, ∞) C) (-4, ∞) D) ($-\infty$, -4) \cup (4, ∞)

36) Use a sign chart to solve the inequality. Express answers in interval notation. 36) _____

$$x^2 + 6 < 2x$$

- A) ($-\infty$, -2) B) {2} C) \emptyset D) (2, ∞)

37) Use a sign chart to solve the inequality. Express answers in interval notation. 37) _____

$$\frac{-5}{-3x - 4} > 0$$

- A) $\left(-\infty, \frac{4}{3}\right)$ B) $\left(-\frac{4}{3}, \infty\right)$ C) (0, ∞) D) $\left(-\infty, -\frac{3}{4}\right)$

Solve the problem.

38) The cost of renting a snowblower is \$20 for the first hour (or any fraction thereof) and \$5 for each additional hour (or fraction thereof) up to a maximum rental time of 5 hours. Write a piecewise definition of the cost C(x) of renting a snowblower for x hours. Is C(x) continuous at x = 2.5? 38) _____

A) $C(x) = \begin{cases} 20 & \text{if } 0 < x \leq 1 \\ 25 & \text{if } 1 < x \leq 2 \\ 30 & \text{if } 2 < x \leq 3; \text{ Yes} \\ 35 & \text{if } 3 < x \leq 4 \\ 40 & \text{if } 4 < x \leq 5 \end{cases}$

B) $C(x) = \begin{cases} 25 & \text{if } 0 < x \leq 1 \\ 30 & \text{if } 1 < x \leq 2 \\ 35 & \text{if } 2 < x \leq 3; \text{ No} \\ 40 & \text{if } 3 < x \leq 4 \\ 45 & \text{if } 4 < x \leq 5 \end{cases}$

C) $C(x) = \begin{cases} 20 & \text{if } 0 < x \leq 1 \\ 25 & \text{if } 1 < x \leq 2 \\ 30 & \text{if } 2 < x \leq 3; \text{ No} \\ 35 & \text{if } 3 < x \leq 4 \\ 40 & \text{if } 4 < x \leq 5 \end{cases}$

D) $C(x) = \begin{cases} 20 & \text{if } 0 \leq x \leq 1 \\ 25 & \text{if } 1 \leq x \leq 2 \\ 30 & \text{if } 2 \leq x \leq 3; \text{ No} \\ 35 & \text{if } 3 \leq x \leq 4 \\ 40 & \text{if } 4 \leq x \leq 5 \end{cases}$