1.5 Infinite Limits

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Assigned Problems: 2, 4, 14, 28, 34, 36, 38, 42, 50, 62, 64, 68, 72, 74, 76

1.5.1 Question 2

Determine whether $f(x)$ ***approaches*** $+\infty$ ***or*** $-\infty$ ***as*** x ***approaches*** 4 ***from the left and from the right.***

$$f(x) = \frac{-1}{x-4}$$

1.5.2 Question 4

Determine whether $f(x)$ ***approaches*** $+\infty$ ***or*** $-\infty$ ***as*** x ***approaches*** 4 ***from the left and from the right.***

$$f(x) = \frac{-1}{(x-4)^2}$$

1.5.3 Question 14

Find the vertical asymptotes (if any) of the graph of the function.

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

1.5.4 Question 28

Find the vertical asymptotes (if any) of the graph of the function.

$$h(t) = \frac{t^2 - 2t}{t^4 - 16}$$

1.5.5 Question 34

Determine whether the graph of the function has a vertical asymptote or a removable discontinuity at $x = -1$***. Use your graphing calculator to confirm your answer***

$$f(x) = \frac{x^2 - 6x - 7}{x + 1}$$

1.5.6 Question 36

Determine whether the graph of the function has a vertical asymptote or a removable discontinuity at $x = -1$***. Use your graphing calculator to confirm your answer***

$$f(x) = \frac{\sin(x + 1)}{x + 1}$$

1.5.7 Question 38

Find the limit (if it exists): $\lim\limits_{x\to 1^-} \dfrac{-1}{(x-1)^2}$

1.5.8 Question 42

Find the limit (if it exists): $\lim\limits_{x\to 4^-} \dfrac{x^2}{x^2+16}$

1.5.9 Question 50

Find the limit (if it exists): $\lim\limits_{x\to(\pi/2)^+} \left(\dfrac{-2}{\cos x}\right)$

1.5.10 Question 62

Does the graph of every rational function have a vertical asymptote? Explain.

1.5.11 Question 64

Given a polynomial $p(x)$***, is it true that the graph of the function given by*** $f(x) = \dfrac{p(x)}{x-1}$ ***has a vertical asymptote at*** $x = 1$***? Why or why not?***

1.5.12 Question 68

A 25-foot ladder is leaning against a house (figure in textbook, not important). If the base of the ladder is pulled away from the house at a rate of 2 ***feet per second, the top will move down the wall at a rate of*** $r = \dfrac{2x}{\sqrt{625 - x^2}}$ ft/s***, where*** x ***is the distance between the base of the ladder and the house.***

1. Find the rate r when x is 7 feet.
2. Find the rate r when x is 15 feet.
3. Find the limit of r as $x \to 25^-$

1.5.13 Question 72

A crossed belt connects a 20-centimeter pulley (10-cm radius) on an electric motor with a 40-centimeter pulley (20cm radius) on a on a saw arbor (figure in textbook, not important). The electric motor runs at 1700 revolutions per minute.

1. Determine the number of revolutions per minute of the saw.
2. How does crossing the belt affect the saw in relation to the motor?
3. Let L be the total length of the belt. Write L as a function of ϕ, where ϕ is measured in radians. What is the domain of the function? (*Hint:* Add the lengths of the straight section of the belt and the length of the belt around each pulley.)

1.5.14 Question 74

True or False? If false, explain why or give an example that shows it is false

The graphs of polynomial functions have no vertical asymptotes.

1.5.15 Question 76

True or False? If false, explain why or give an example that shows it is false

If f has a vertical asymptote at $x = 0$, then f is undefined at $x = 0$