Math 2413 Instructor: Adnan Said Chapter 1 Sections 1.2, 1.3, 1.4, and 1.5

1.2 Finding Limits Graphically and Numerically

Create a table of values for the function and use the result to estimate the limit.

1) $f(x) = x^2 + 1$ 1) _____

x	1.9	1.99	1.999	2	2.001	2.01	2.1
f(x)							

2) $f(x) = \dfrac{x+4}{x-2}$ 2) _____

x	1.9	1.99	1.999	2	2.001	2.01	2.1
f(x)							

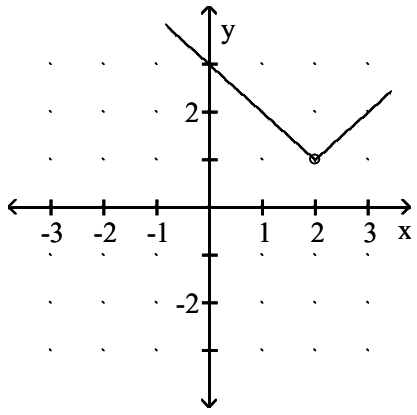
Complete the table and use the result to estimate the limit.

3) $f(x) = \sin\left(\dfrac{1}{x}\right)$ 3) _____

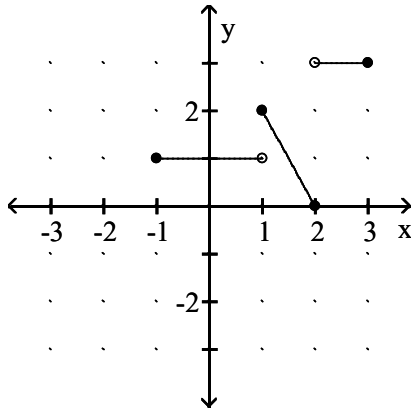
x	0	$\frac{2}{11\pi}$	$\frac{2}{9\pi}$	$\frac{2}{7\pi}$	$\frac{2}{5\pi}$	$\frac{2}{3\pi}$	$\frac{2}{\pi}$
f(x)							

Solve the problem.

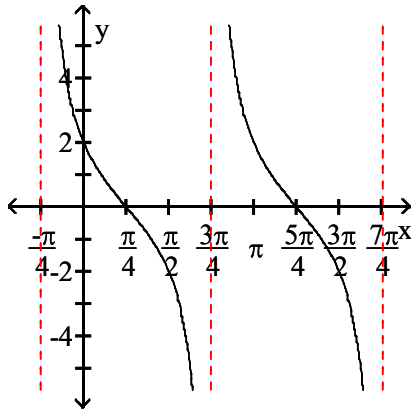
4) Find the limit of f(x) as x approaches 2. 4) _____



5) **Find the limit of f(x) as x approaches 1.** 5) _____



6) **Find the limit of f(x) as x approaches $\frac{3\pi}{4}$.** 6) _____



Graph the function, and find the indicated limit (if it exists).

7) $f(x) = \begin{cases} 3, & x \neq 2 \\ 0, & x = 2 \end{cases}$ **Find the limit of f(x) as x approaches 2.** 7) _____

8) $f(x) = \frac{|x-1|}{x-1}$ **Find the limit of f(x) as x approaches 1.** 8) _____

1.2 Exercises pg 55: (3, 13, 19, 20, 23) (17, 18, 25)

1.3 Evaluating Limits Analytically

Evaluate the limit if it exists.

9) $\lim_{x \to -2} (x^3 + 5x^2 - 7x + 1)$ 9) _____

Evaluate the limit if it exists.

10) $\lim_{x \to -1} \sqrt{x^2 - 19x + 25}$ 10) _____

11) $\lim_{x \to 3} f(g(x))$ when $f(x) = x + 7$ and $g(x) = x^2$ 11) _____

12) $\lim_{x \to 3} \frac{x^2 + 9}{x - 3}$ 12) _____

13) $\lim_{x \to 2} \frac{x^3 + x^2 - 6x}{2x - 4}$ 13) _____

14) $\lim_{x \to 3} \frac{x^3 - 27}{4x - 12}$ 14) _____

15) $\lim_{x \to 1} \frac{2x^4 - 2}{3x - 3}$ 15) _____

16) $\lim_{x \to 0} \frac{\sqrt{x + 1} - 1}{x}$ 16) _____

17) $\lim_{x \to 0} \frac{\frac{1}{x + 2} - \frac{1}{2}}{x}$ 17) _____

Find the limit that involves a trigonometric function.

18) $\lim_{x \to 0} \frac{\sin 4x}{x}$ 18) _____

19) $\lim_{x \to 0} \frac{\cos 2x - 1}{5x}$ 19) _____

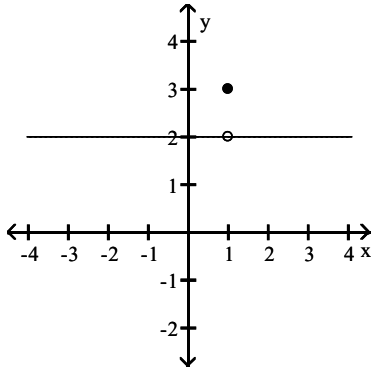
20) $\lim_{x \to 0} \frac{\tan x}{x}$ 20) _____

1.3 Exercises pg 67:

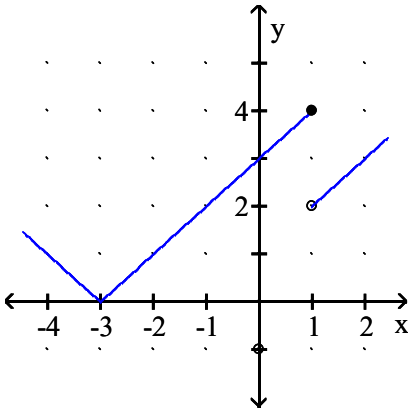
(25, 35, 36, 44, 45, 63, 65, 67, 71) **(26, 53, 57, 64, 66, 72, 73)**

1.4 Continuity and One–Sided Limits

Find all points where the function is not continuous.

21) 

21) _____

22) 

22) _____

Find the constant a such that the function is continuous on the entire real line.

23) $f(x) = \begin{cases} 3x^3, & x \le 1 \\ ax + 5, & x > 1 \end{cases}$

23) _____

Discuss the continuity of each function at the indicated value.

24) $f(x) = \dfrac{3}{x+2}$, at $x = -2$

24) _____

25) $f(x) = \dfrac{x^2 - 1}{4x - 4}$, at $x = 1$

25) _____

26) $f(x) = \begin{cases} x^2 + 1, & x > 0 \\ x + 1, & x \le 0 \end{cases}$, at $x = 0$

26) _____

Find the limit , if it exists.

27) $\lim_{x \to 3^-} \left(x^3 + \sqrt{9 - x^2} \right)$ 27) _____

28) $\lim_{x \to 3^+} \sqrt{9 - x^2}$ 28) _____

29) $\lim_{x \to 2^+} \frac{4x - 8}{x^2 - 4}$ 29) _____

30) $\lim_{x \to -1^-} f(x) = \begin{cases} 5x + 2, & x < -1 \\ x - 2, & x > -1 \end{cases}$ 30) _____

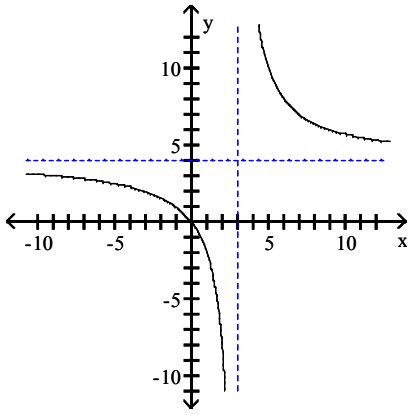
1.4 Exercises pg79

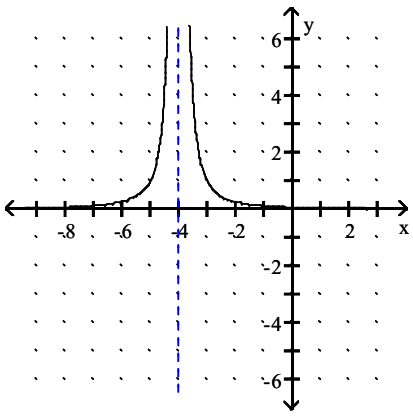
(3, 5, 9, 18, 40, 47, 62, 77) **(11, 14, 41, 54, 80)**

1.5 Infinite limits

Determine the limit of the function.

31) **a) as $x \to 3^-$ and as $x \to 3^+$** **b) as $x \to -4^-$ and as $x \to -4^+$** 31) _____





Find any vertical asymptotes.

32) $f(x) = \frac{1}{2(x + 1)}$ 32) _____

33) $f(x) = \frac{x^2 + 9}{x^2 - 9}$ 33) _____

34) $f(x) = \dfrac{x^2 + 2x - 8}{x^2 - 4}$ 34) _____

Find each limit .

35) $\lim\limits_{x \to 1^+} \dfrac{x^2 + 3x}{x - 1}$ 35) _____

36) $\lim\limits_{x \to -1^-} \dfrac{x^2 - 2x + 1}{x + 1}$ 36) _____

37) $\lim\limits_{x \to 5^+} \left(x^2 + \dfrac{3}{x - 5} \right)$ 37) _____

38) $\lim\limits_{x \to \frac{\pi}{2}^+} \dfrac{-2}{\cos x}$ 38) _____

1.5 Exercises pg88

(2, 3, 15, 17, 29, 33, 37, 41, 43) **(22, 24, 30, 34, 38, 42)**