Lesson 6.3: Reciprocal Functions

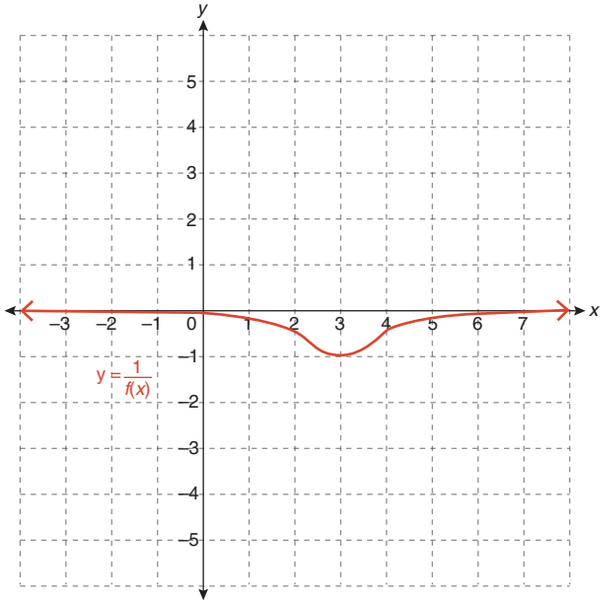
Complete the *Practice* below. When you have completed all the questions for *Lesson 6.3 Practice – VI* with your best work, mark your work by first comparing your answers to the solutions provided in *Appendix 2: Solutions*. Then, apply the rubric found at the beginning of the *Workbook*.

Practice – VI

1. Determine the location of any asymptotes on the graph of $y = \frac{1}{x^2 + 4x - 7}$ and any intersections of the graphs of $y = x^2 + 4x - 7$ and $y = \frac{1}{x^2 + 4x - 7}$.

2. Sketch the graph of $y = \dfrac{1}{x^2 - 2x + 1}$.

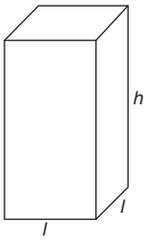
3. Use the graph of $y = \dfrac{1}{f(x)}$ to sketch the graph of $y = f(x)$.



4. Use technology to graph $y = \frac{1}{14x^2 - 19x + 6}$. Describe the steps used.

5. Explain why functions of the form $y = \frac{1}{f(x)}$ cannot equal zero. How does this relate to an asymptote?

6. a. Write a reciprocal function that relates the length and height of a square prism that has a volume of 1 cubic unit.



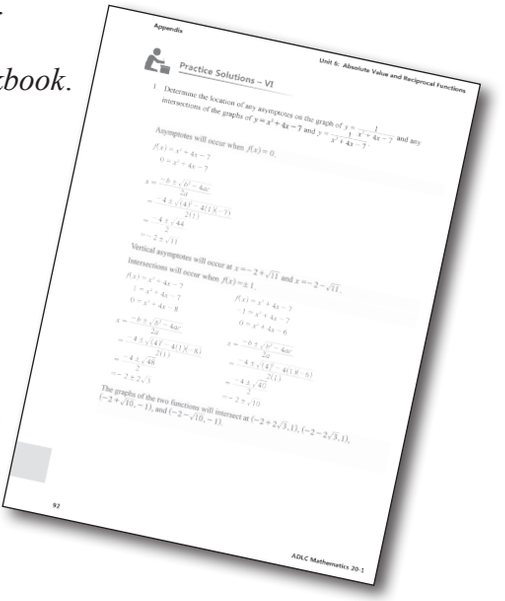
b. State the domain and range of the function.

c. Sketch the graph of the function.

Mark your work for *Lesson 6.3 Practice – VI* using the solutions provided in *Appendix 2: Solutions*. Then, apply the rubric found at the beginning of the *Workbook*.

Transfer your self-assessed mark to the front cover of the *Workbook*.

My self-assessed mark on *Lesson 6.3 Practice – VI* is _____.


Appendix

Unit 6: Absolute Value and Reciprocal Functions

Practice Solutions – VI

1. Determine the location of any asymptotes on the graph of $y = \frac{1}{x^2+4x-7}$ and any intersections of the graphs of $y = x^2+4x-7$ and $y = \frac{1}{x^2+4x-7}$.

Asymptotes will occur when $f(x) = 0$.

$0 = x^2 + 4x - 7$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= \frac{-4 \pm \sqrt{(4)^2-4(1)(-7)}}{2(1)}$

$= \frac{-4 \pm \sqrt{44}}{2}$

$= -2 \pm \sqrt{11}$

Vertical asymptotes will occur at $x = -2+\sqrt{11}$ and $x = -2-\sqrt{11}$.

Intersections will occur when $f(x) = \pm 1$.

$f(x) = x^2 + 4x - 7$

$1 = x^2 + 4x - 7$

$0 = x^2 + 4x - 8$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= \frac{-4 \pm \sqrt{(4)^2-4(1)(-8)}}{2(1)}$

$= \frac{-4 \pm \sqrt{48}}{2}$

$= -2 \pm 2\sqrt{3}$

$f(x) = x^2 + 4x - 7$

$-1 = x^2 + 4x - 7$

$0 = x^2 + 4x - 6$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= \frac{-4 \pm \sqrt{(4)^2-4(1)(-6)}}{2(1)}$

$= \frac{-4 \pm \sqrt{40}}{2}$

$= -2 \pm \sqrt{10}$

The graphs of the two functions will intersect at $(-2+2\sqrt{3}, 1), (-2-2\sqrt{3}, 1), (-2+\sqrt{10}, -1)$, and $(-2-\sqrt{10}, -1)$.

92

ADLC Mathematics 20-1

Reflect on your understanding of the concepts addressed in the *Practice* exercises in the table provided.

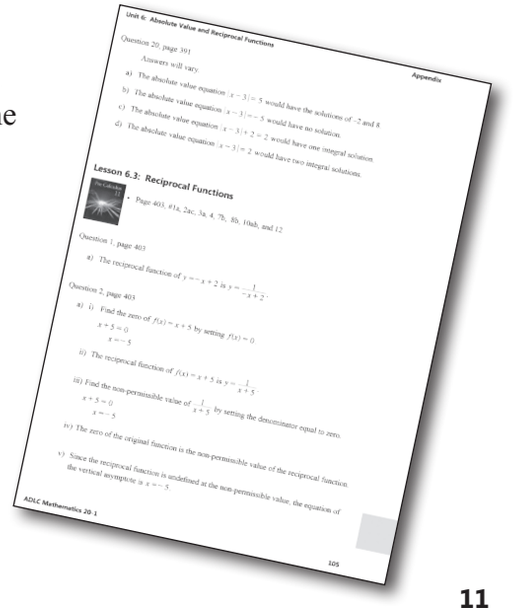
Question Number	Got it!	Almost there…	Need to retry or ask for help.	Similar questions from *Pre-Calculus 11*
1				p.403 #2c
2				p.404 #8b
3				p.406 #10b
4				
5				
6				p.406 #12

You may proceed to *Explore Your Understanding Assignment* on the next page of this *Workbook*.

Note: Before you complete *Explore Your Understanding*, you may review your skills and get more practice by completing the following problems in *Pre-Calculus 11*.

- Page 403, #1a, 2ac, 3a, 4, 7a, 8b, 10ab, 12

Check your work in *Enhance Your Understanding*.


Unit 6: Absolute Value and Reciprocal Functions

Question 20, page 301

Answers will vary.

a) The absolute value equation $|x-3| = -5$ would have the solutions of -2 and 8.

b) The absolute value equation $|x-3| = -5$ would have no solution.

c) The absolute value equation $|x-5|+2 = 2$ would have one integral solution.

d) The absolute value equation $|x-3| = 2$ would have two integral solutions.

Appendix

Lesson 6.3: Reciprocal Functions

Page 403, #1a, 2ac, 3a, 4, 7b, 8b, 10ab, and 12

Question 1, page 403

a) The reciprocal function of $y = -x + 2$ is $y = \frac{1}{-x+2}$.

Question 2, page 403

a) i) Find the zero of $f(x) = x + 5$ by setting $f(x) = 0$

$x + 5 = 0$

$x = -5$

ii) The reciprocal function of $f(x) = x + 5$ is $y = \frac{1}{x+5}$.

iii) Find the non-permissible value of $\frac{1}{x+5}$ by setting the denominator equal to zero.

$x + 5 = 0$

$x = -5$

iv) The zero of the original function is the non-permissible value of the reciprocal function.

v) Since the reciprocal function is undefined at the non-permissible value, the equation of the vertical asymptote is $x = -5$.

ADLC Mathematics 20-1

105