

## **Build-A-Function: Algebra Edition V**

**or**

**“Find an algebraic expression for a rational function given specific conditions.”**

Engagement Activity for Section 4.1 of Precalculus, Third Edition, Stitz and Zeager

Primary Section: 4.1

Secondary Sections: 4.2

Key Concepts: Rational functions

This activity is designed to help you more fully understand the concepts presented in Section 4.1 of the textbook. It is not a replacement for the regular homework, but rather, is a deeper investigation into the material presented in Section 4.1 and how it is connected to other material presented in other sections. Your professor will have specific instructions as to how he/she wants the activity to fit into the class so please pay attention in class when this activity is assigned.

For each set of characteristics given below, create at least one rational function  $f$  that has those desired characteristics. There may be many functions that satisfy the conditions, so be creative and come up with interesting alternatives! You may leave your answers “unsimplified” if need be.

1.
  - $x = 3$  is a vertical asymptote of the graph of  $y = f(x)$
  - $y = 0$  is the horizontal asymptote of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

2.
  - $x = -2$  and  $x = 0$  are vertical asymptotes of the graph of  $y = f(x)$
  - $y = 5$  is the horizontal asymptote of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

3.
  - $x = -\frac{8}{5}$  is a vertical asymptote of the graph of  $y = f(x)$
  - There is no horizontal asymptote to the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

4.
  - There are no vertical asymptotes to the graph of  $y = f(x)$
  - $y = 0$  is the horizontal asymptote of the graph of  $y = f(x)$
  - $(3, 5)$  is a hole in the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

5.
  - There are no vertical asymptotes to the graph of  $y = f(x)$
  - $y = -\frac{8}{5}$  is the horizontal asymptote of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

6.
  - $x = -2$  and  $x = 0$  are vertical asymptotes of the graph of  $y = f(x)$
  - $y = 0$  is the horizontal asymptote of the graph of  $y = f(x)$
  - $(1, 0)$  is an  $x$ -intercept of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

- 7.
- $x = 1$  is a vertical asymptote of the graph of  $y = f(x)$
  - $y = 0$  is the horizontal asymptote of the graph of  $y = f(x)$
  - $(-5, 0)$  and  $(3, 0)$  are  $x$ -intercepts of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

- 8.
- $y = 5$  is the horizontal asymptote to the graph of  $y = f(x)$
  - The point  $(4, 0)$  is a local maximum on the graph of  $y = f(x)$
  - $(-3, 1)$  and  $(0, 0)$  are holes in the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

- 9.
- $x = 0$  is a vertical asymptote of the graph of  $y = f(x)$
  - $y = x$  is the slant asymptote of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

- 10.
- $x = 7$  and  $x = 8$  are vertical asymptotes of the graph of  $y = f(x)$
  - $y = -3x + 5$  is the slant asymptote of the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

- 11.
- $y = x$  is the slant asymptote of the graph of  $y = f(x)$
  - The graph of  $y = f(x)$  crosses the slant asymptote when  $x = 4$

$$f(x) = \underline{\hspace{2cm}}$$

- 12.
- $x = -3$  is a vertical asymptote of the graph of  $y = f(x)$
  - $y = -\frac{2}{3}x + 1$  is the slant asymptote of the graph of  $y = f(x)$
  - The graph of  $y = f(x)$  crosses the slant asymptote when  $x = 6$
  - $(0, 0)$  is a hole in the graph of  $y = f(x)$

$$f(x) = \underline{\hspace{2cm}}$$

**Student Questionnaire for  
Build-A-Function: Algebra Edition V**

This Engagement Activity was created with one purpose in mind - to help you the student better understand the concepts presented in College Algebra. Whereas we think the activity does its job, the truth is that we need to know from you if it actually helped you learn. Please take a few minutes to complete this questionnaire anonymously and return it to your instructor. Your feedback will be used to improve the activity for next semester.

1. For Questions 1a through 1e below, please place an X in the box which most closely matches your opinion.

- (a) Before I began the activity, my understanding of the material was best described as

Clueless	Not so good	Meh	Pretty good	I pwned it!

- (b) After completing the activity, my understanding of the material is best described as

Clueless	Not so good	Meh	Pretty good	I pwn it!

- (c) The connection between the activity and the course material was clear

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- (d) The activity's instructions were clear

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- (e) The activity was a good use of class time

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. What did you like about the activity?

Continued on back →

3. How can we improve the activity?

4. Other comments: