

Build-A-Function: Algebra Edition I
or
“Find an expression for a function given its domain.”

Engagement Activity for Section 1.4 of Precalculus, Third Edition, Stitz and Zeager

Primary Section: 1.4

Secondary Sections: 1.1 and 1.3

Key Concepts: Domain of a function, interval notation

This activity is designed to help you more fully understand the concepts presented in Section 1.4 of the textbook. It is not a replacement for the regular homework, but rather, is a deeper investigation into the material presented in the section 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.

In the Exercises in Section 1.4, we asked you to find the implied domain of a function given its algebraic description in function notation. In Part One of this Activity we go the other way – we give you the domain and ask you to find an expression for a function that has the specified domain. There may be infinitely many correct answers for a given domain so don't worry if your expressions don't match those of your classmates. In fact, we encourage you to be creative! In Part Two, we ask some open-response questions which require written answers and perhaps some computation or the use of a graphing utility.

Part One: Find an algebraic expression for a function that has the specified implied domain.

1. $(-\infty, \infty)$

2. $[0, \infty)$

3. $(-\infty, -5) \cup (-5, \infty)$

4. $\left(-\infty, \frac{1}{34}\right]$

5. $(-\infty, 2) \cup (2, 5) \cup (5, \infty)$

6. $(-\infty, -\sqrt{13}) \cup (-\sqrt{13}, \sqrt{13}) \cup (\sqrt{13}, \infty)$

7. $(-\infty, -4) \cup (-4, -1) \cup (-1, 8) \cup (8, \infty)$

8. $[0, 4) \cup (4, \infty)$

9. $(-\infty, 0)$

10. $\left[-27, \frac{19}{5}\right) \cup \left(\frac{19}{5}, \infty\right)$

11. $[0, 1]$

12. $(0, 1]$

Part Two: These open-response questions tie together concepts from several different sections so you may need to refer to your textbook as you think about your answers.

13. The functions $f(x) = x$, $g(x) = \sqrt{x^2 + 1}$ and $h(x) = \frac{1}{x^2 + 1}$ all have domain $(-\infty, \infty)$ but have very different ranges. Explain in your own words – without using graphs – how one can find the ranges of the functions.

14. Now try to find the range of $f(x) = \frac{\sqrt{25x^2 + 1}}{x^2 + 1}$. (You *might* need a graphing utility here.) In general, do you think you could find the range of a function given only an algebraic description of it? Discuss the difficulties you are confronted with when trying to find the range of an arbitrary function.

15. What is the implied domain of $f(x) = \frac{2x - 2}{x - 1}$? What is its range? Use your results to create a function that has domain $(-\infty, 0) \cup (0, \infty)$ and range $\{-3\}$.

16. Find the domain of $f(x) = \sqrt{x} - \sqrt{-x}$. Use your result to find a function with domain $\{-7\}$.

17. Why it is impossible to have a function like $f(x) = \sqrt{x - 6} + \sqrt{2 - x}$?

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

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: