

Build-A-Function: Graphical Edition I
or
“Find the graph of a function given its domain and range.”

Engagement Activity for Section 1.3 of Precalculus, Third Edition, Stitz and Zeager

Primary Section: 1.3

Secondary Sections: 1.1 and 1.2

Key Concepts: Graphs of functions, domain and range of a function, interval notation

This activity is designed to help you more fully understand the concepts presented in Section 1.3 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 1.3, we asked you to find the domain and range of a function given its graph. In Part One of this Activity we go the other way – we give you the domain and range and ask you to sketch the graph of a function that has the specified domain and range. There may be infinitely many correct answers for a given domain and range so don't worry if your graphs 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 a graph or two.

Part One: Sketch the graph of a function that has the specified domain and range.

1. Domain = $[0, 1]$
Range = $[2, 5]$

2. Domain = $(0, 1]$
Range = $(2, 5]$

3. Domain = $[-4, \sqrt{3}) \cup (\sqrt{3}, 5]$
Range = $\left[-27, \frac{1}{34}\right]$

4. Domain = $\left[-27, \frac{1}{34}\right]$
Range = $[-4, \sqrt{3}) \cup (\sqrt{3}, 5]$

5. Domain = $(-\infty, \infty)$
Range = $(-\infty, \infty)$

6. Domain = $[0, \infty)$
Range = $[-5, \infty)$

7. Domain = $\{-1, 0, 1, 6\}$
 Range = $\{3, 5, 8\}$

8. Domain = $[-13, -\sqrt{2}] \cup [4, 20]$
 Range = $[0, 1) \cup \left\{\frac{2}{5}\right\}$

9. Domain = $(-5, -1] \cup \{0, 1, 6\}$
 Range = $\{-1, 3\}$

10. Domain = $(-\infty, -4) \cup (-4, -1] \cup (3, 8) \cup (8, \infty)$
 Range = $(-\infty, 0) \cup (0, 5)$

11. Domain = $(-\infty, \infty)$
 Range = $\{0\}$

12. Domain = $[0, \infty)$
 Range = $(-\infty, \infty)$

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. What number must be in the range of a function f if the graph of f has an x -intercept? Explain your answer.
14. What number must be in the domain of a function f if the graph of f has a y -intercept? Explain your answer.
15. Why it is impossible to have a function with domain $\{3, 5, 8\}$ and range $\{-1, 0, 1, 6\}$?
16. How would you describe the graph of a function whose domain is \mathbb{R} (the set of all real numbers) and whose range is \mathbb{Z} (the set of integers)? Could you draw such a graph? Explain your answer.

17. It is possible for a function to have domain $[0, 1)$ and range $[0, \infty)$ even though we haven't seen one like it yet. Describe the behavior of the graph for x values slightly less than 1 that would allow the range to be $[0, \infty)$. How would you sketch the graph of such a function?
18. It is possible for a function to have domain $[0, 1) \cup (1, 2]$ and range $(-\infty, \infty)$ even though we haven't seen one like it yet. Describe the behavior of the graph for x values close to, but not equal to, 1 that would allow the range to be $(-\infty, \infty)$. How would you sketch the graph of such a function?

**Student Questionnaire for
Build-A-Function: Graphical 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: