# Functions in Design

Teaching Suggestions

- Although it is not necessary, this task could be done with graphing software.
- Students should create a rough draft of what they want their own graph to look like before they actually try to create it.
- Assure students that careful graphing will yield a specific shape for this task.
- You may wish to create several different scenarios to allow students to observe before graphing the given set of equations.

Hints for Evaluating a Response

Student responses are being assessed for the level of mathematical understanding they represent. As you assess each response, consider the following questions:

- Are graphs properly constructed and fully labelled?
- Is the significance of $x = 2$ recognized and explained?
- Does the created design contain a variety of transformations of the specified functions?
- Are equations and domains provided for created design?
- Does the created design contain transformations of other functions?

Level 3 Sample Response

a)
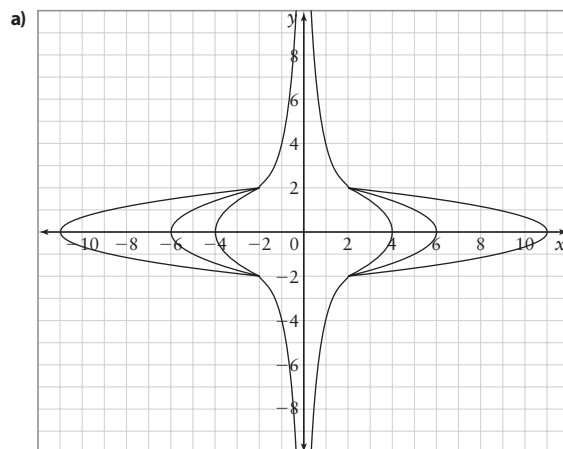
b) This is where one function stops and another one starts, so that the pieces are connected.

c) Answers may vary. Sample answer:
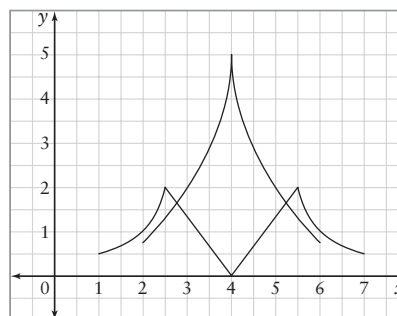
$y = \dfrac{-1}{x-3}$, $1 \le x \le 2.5$

$y = \dfrac{1}{x-5}$, $5.5 \le x \le 7$

$y = -3\sqrt{x-4} + 5$, $4 \le x \le 6$

$y = -3\sqrt{-x+4} + 5$, $2 \le x \le 4$

$y = -\dfrac{4}{3}x + \dfrac{16}{3}$, $2.5 \le x \le 4$

$y = \dfrac{4}{3}x - \dfrac{16}{3}$, $4 \le x \le 5.5$

Level 3 Notes

Look for the following:
- Correctly draws graphs of transformed functions, including proper domain usage
- Recognizes and explains the role of $x = 2$
- Creates a design, with or without technology, using transformations of specified functions
- Provides equations and domains of transformed functions used in created design
- Labels graphs properly

What Distinguishes Level 2

- Draws more than half of the graphs of transformed functions correctly, including proper domain usage
- Provides a somewhat accurate explanation of the role of $x = 2$
- Creates a very simple design, with or without technology, using transformations of specified functions
- Provides equations and domains of transformed functions in own design
- Graphs are somewhat labelled

What Distinguishes Level 4

- All graphs of transformed functions are drawn correctly, including proper domain usage
- Recognizes and provides detailed explanation of the role of $x = 2$
- Creates a complex design, with or without technology, using transformations of specified functions
- Provides equations and justified domains of transformed functions used in created design
- Graphs are clearly and fully labelled