

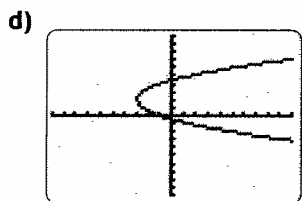
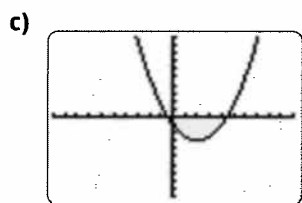
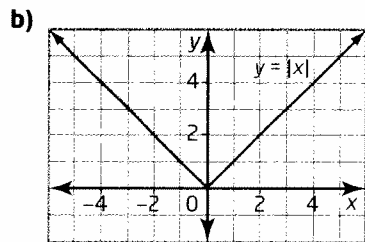
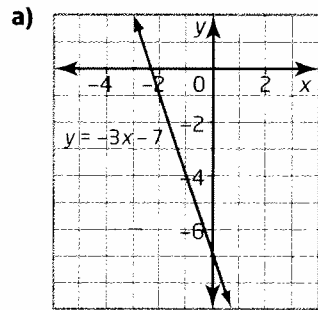
Communicate Your Understanding

- C1** Suzanne is unclear as to why the graphs of $y = x^2$ and $x = y^2$ are different, and why one is a function and the other is not. How would you help Suzanne?
- C2** Is it possible to determine if a relation is a function if you are only given the domain and range in set notation? Explain your reasoning.
- C3** Sagar missed the class on restrictions and has asked you for help. Lead him through the steps needed to find the domain and range of the function $y = \frac{-4}{2x + 1}$.

A Practise

For help with questions 1 and 2, refer to Example 1.

1. Which graphs represent functions? Justify your answer.



2. Is each relation a function? Explain. Sketch a graph of each.

- a) $y = x - 5$
 b) $x = y^2 - 3$
 c) $y = 2(x - 1)^2 - 2$
 d) $x^2 + y^2 = 4$

For help with questions 3 and 4, refer to Example 2.

3. State the domain and the range of each relation. Is each relation a function? Justify your answer.

- a) $\{(5, 5), (6, 6), (7, 7), (8, 8), (9, 9)\}$
 b) $\{(3, -1), (4, -1), (5, -1), (6, -1)\}$
 c) $\{(1, 6), (1, -14), (1, 11), (1, -8), (1, 0)\}$
 d) $\{(1, 5), (4, 11), (3, 9), (5, 1), (11, 4)\}$
 e) $\{(3, 2), (2, 1), (1, 0), (2, -1), (3, -2)\}$

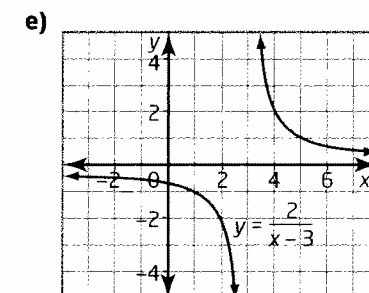
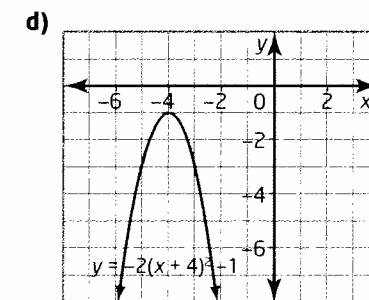
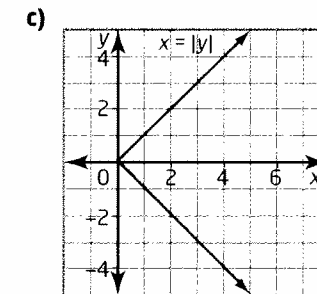
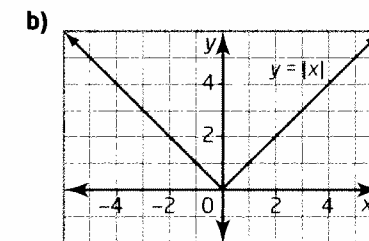
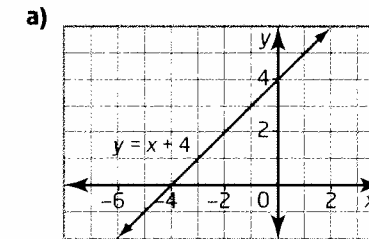
4. The domain and range of some relations are given. Each relation consists of five points. Is each a function? Explain.

- a) domain $\{1, 2, 3, 4, 5\}$, range $\{4\}$
 b) domain $\{-3, -1, 1, 3, 5\}$, range $\{2, 4, 6, 8, 10\}$
 c) domain $\{2, 3, 6\}$, range $\{-4, 6, 7, 11, 15\}$
 d) domain $\{-2\}$, range $\{9, 10, 11, 12, 13\}$

B Connect and Apply

For help with questions 5 and 6, refer to Example 3.

5. State the domain and the range of each relation.



6. Determine the domain and the range of each relation. Use a graph to help if necessary.

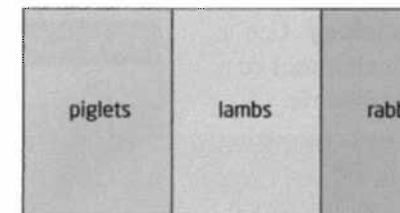
- a) $y = -x + 3$ b) $y = (x - 2)^2$
 c) $y = -3x^2 + 1$ d) $x^2 + y^2 = 4$
 e) $y = \frac{1}{x + 3}$ f) $y = \sqrt{x - 1}$

7. For each given domain and range, determine if a relation is a function and if not, use the same set of axes to sketch a relation that is not a function.

- a) domain $\{x \in \mathbb{R}\}$, range $\{y \in \mathbb{R}\}$
 b) domain $\{x \in \mathbb{R}, x \geq 4\}$, range $\{y \in \mathbb{R}, y \geq 0\}$
 c) domain $\{x \in \mathbb{R}\}$, range $\{y \in \mathbb{R}, y \geq 0\}$
 d) domain $\{x \in \mathbb{R}, x \leq 2\}$, range $\{x \in \mathbb{R}, y \geq -2\}$

For help with questions 8 and 9, refer to Example 4.

8. Soula has 90 m of fencing to enclose an area in a petting zoo with two dimensions. She wants to separate three types of young animals into three pens. The area of each pen is to have the same area.



- a) Express the area function for each pen in terms of x .
 b) Determine the domain and the range of the area function.

9. Is each relation a function? Justify your answer. If the relation is a function, state the independent variable and the dependent variable.

- a) The amount of money taken for a fundraiser is related to the number of raffle tickets a hockey team sells.
 b) The age of students is related to their grade level.
 c) The time it takes Jung Yoo to walk to school is related to the speed he walks.