

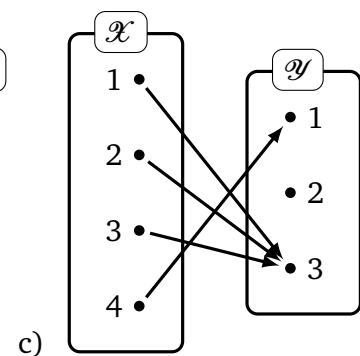
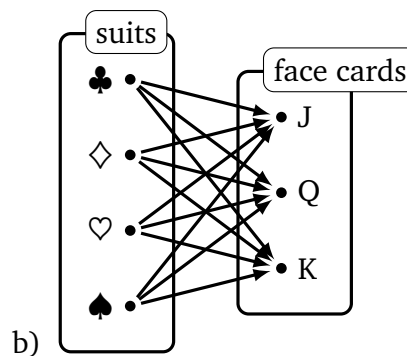
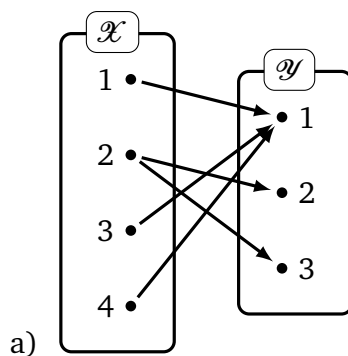
Introduction to Functions

In these exercises, we work with basic vocabulary and ideas associated with functions and relations.

1. Writing function formulas:

- a) Let f be a function that triples its input, and then subtracts 4. Write a formula for this function.
- b) Let b be a function that squares its input, then divides by two, and then adds 1. Write a formula for this function.
- c) Barack Obama was born on August 4th, 1961. Let “age” be a function that finds his age on August 5th in year x . Write a formula for this function. Hint, you may want to calculate his age in years like 2000, 2008, and 2016 first to get a feel for what the formula will look like.
- d) Suppose that income tax is collected at a flat rate of 15%. Let “tax” be the function that finds what your income tax amount is for the year based on what your annual income is. Write a formula for this function.

2. Below are several diagrams of *relations*. Which of these relations can be thought of as *functions*? For each, give an explanation why or why not.



3. For each of these relations between x and y , decide if y is a function of x . For each relation, after you make your decision, say a little bit about why. If you decide that the relation *can* be used to define a function, then you can just say that. But if it *cannot*, then give a reason why. For example, you might say something like “2 is in the domain, but it is unclear what $f(2)$ would be.”

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

e) $\frac{1}{x+y} = 13$ f) $|y| - x^3 = x^2$ g) $y = \pm\sqrt{x}$ h) $x = \frac{y+1}{y-2}$

4. Verbal interpretation: in the following scenarios, is y a function of x ? If not, explain why not.

- a) Let x represent the height of a person (a person in general, not one specific person), and y represent weight.
- b) Let x represent the square footage of the walls in a regular rectangular room that you need to wallpaper, and y represent the number of rolls of wallpaper that you will need. (Your wallpaper store sells it in rolls of 100 square feet.)
- c) Let x represent the number of beers that Julia has drank in the past hour, and y represent her blood alcohol content.

5. Let

$$f(x) = x^2 - 4x, \quad g(x) = \frac{\sqrt{x-4}}{x^{4/3}}$$

and $h(x)$ be the number of eggs you have if you bought x dozen eggs. Evaluate each of the following.

a) $f(10)$ b) $f(-3)$ c) $g(4)$ d) $f(8)$

e) $h(3)$ f) $f(5) + h(9)$ g) $2h(3) - h(1)$ h) $\frac{g(125)}{f(1) + h(2)}$