



Grade 6 Math Circles
March 31st, 2021
Intro to Functions: Problem Set

For Questions 1–4, it can be helpful to organise your answers into a table like this:

x	-3	-2	-1	0	1	2	3
$f(x) = x + 3$	0	1	2	3	4	5	6

If an answer is undefined, you can leave your answer as “undefined” or “DNE” (which stands for “Does Not Exist”).

For an extra challenge in Questions 1–3, try finding the range of each function!

1. Evaluate each function for $x = -3$, $x = -2$, $x = -1$, $x = 0$, $x = 1$, $x = 2$, and $x = 3$.
Find the domain of each function.

(a) $f(x) = x - 2$

(b) $g(x) = 3x - 5$

(c) $h(x) = -x + 25$

(d) $j(x) = \frac{x+5}{2}$

(e) $k(x) = \frac{1}{4}x$

(f) $l(x) = 100 - 10x$

2. Evaluate each function for $x = -3$, $x = -2$, $x = -1$, $x = 0$, $x = 1$, $x = 2$, and $x = 3$.
Find the domain of each function.

(a) $f(x) = x^2 + 2$

(b) $g(x) = \frac{x^2}{2}$

(c) $h(x) = -x^2$

(d) $j(x) = 2x^2$

(e) $k(x) = 0.5x^2 + x$

(f) $l(x) = x^2 + 4x + 3$

3. Evaluate each function for $x = -3$, $x = -2$, $x = -1$, $x = 0$, $x = 1$, $x = 2$, and $x = 3$. Find the domain of each function.

(a) $f(x) = x^3$

(b) $g(x) = x^4$

(c) $h(x) = x^5$

4. Evaluate each function for $x = -3$, $x = -2$, $x = -1$, $x = 0$, $x = 1$, $x = 2$, and $x = 3$. Find the domain of each function.

(a) $f(x) = \frac{1}{x+1}$

(b) $g(x) = \frac{3}{2x}$

(c) $h(x) = \frac{x}{x-4}$

(d) $j(x) = \frac{x+1}{x+2}$

(e) $k(x) = \frac{5x}{5x+2}$

(f) $l(x) = \frac{x^2}{x}$

5. The cost of a taxi ride is a base rate of \$3.50 plus \$1.50 per kilometre travelled.

(a) Express the cost of a taxi as a function. Use C as the function name (to represent “Cost”), and use d as the variable name (to represent “distance”).

(b) Calculate the cost of a 10km trip.

(c) Calculate the cost of a 175km trip.

(d) What is the domain of the function $C(d)$?

(e) What is the range of the function $C(d)$?

6. At a particular buffet restaurant, it costs each person \$26 to eat dinner. The restaurant also charges a fee of \$0.30 for every 100g of leftover food at the end of the meal.

(a) Express the total cost of a meal as a function. Use C as the function name (to represent “Cost”), and use f as the variable name (to represent “food”).

(b) Calculate the total cost of a meal, where the person leaves 100g of leftover food.

(c) Calculate the total cost of a meal, where the person leaves no leftover food.

- (d) Calculate the total cost of a meal, where the person leaves 670g of leftover food.
 - (e) What is the domain of the function $C(f)$?
 - (f) What is the range of the function $C(f)$?
7. A farmer is planning to purchase some straight fencing to build an enclosed pasture for their chickens. Each metre of fencing costs \$10 to purchase and install.
- (a) Construct a function that takes in the farmer's budget, which is the amount of money they plan to spend purchasing fencing, and outputs the maximum area of the pasture that could be built. Use A as the function name (to represent "Area"), and use b as the variable name (to represent "budget"). (Hint: The area of the pasture can be maximised by building it in the shape of a square.)
 - (b) What is the area of the largest pasture that could be constructed with a budget of \$200?
 - (c) What is the area of the largest pasture that could be constructed with a budget of \$1000?
 - (d) What is the domain of the function $A(b)$?
 - (e) What is the range of the function $A(b)$?