

Math 10250 Activity 1: Functions and their Geometric Properties¹ (Sec. 0.2–0.3)

GOAL: Understand the fundamental concept of function as a relation between variables expressed by a formula, a graph, or a table and use it to model change.

Q1: What is a variable? What is a function?

A1:

Example Assume that you have just deposited \$500 in your bank account at the ND Credit Union that pays annual interest 2% compounded daily, and you want to know what will be the balance at any future day. Use variables and functions to model it.

Exercise 1 Consider the function $f(x) = x^2 + 1$.

(a) Compute the following table of its values:

x	-3	-2	-1	0	1	2	3
$f(x)$							

(b) Compute $f(1 + h) =$

(c) Find the (natural) domain of f .

(d) Find the range of f .

(e) Sketch the graph of f .

Exercise 2 What is the natural domain of $f(x) = \frac{5}{x^2 - 9}$?

Exercise 3 Which of the curves below:

(a) is the graph of a function

(b) is the graph of a 1-1 function

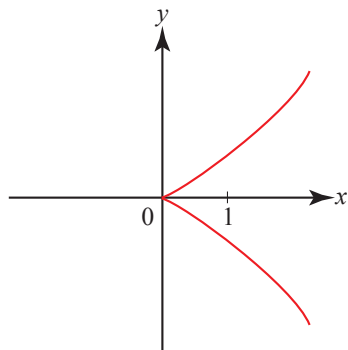


Figure 1

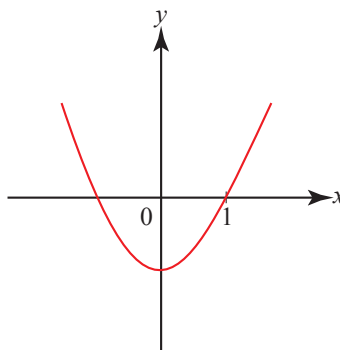


Figure 2

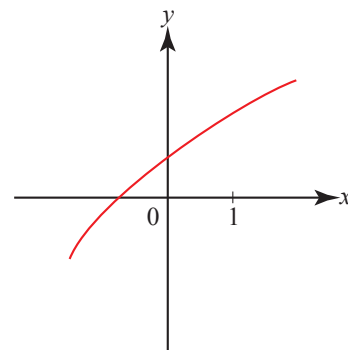


Figure 3

¹Alex Himonas & Alan Howard: Calculus, Ideas and Applications, Wiley (2003).

Exercise 4 Find the inverse of the function $f(x) = 2x + 1$ and sketch its graph.

Exercise 5 For the function shown in Figure 2 determine where it is increasing and where it is decreasing.

Exercise 6 Is the function $f(x) = x^4 - 3x^2$ even or odd? What about $f(x) = x^3 + x$?

Exercise 7 For the the function $f(x)$, whose graph is shown in Figure 4, sketch the following vertical and horizontal translations

- (a) $y = f(x)+3$ (b) $y = f(x)-1$ (c) $y = f(x-1)$ (d) $y = f(x+2)$ (e) $y = f(x+2)+3$
on the same system of Cartesian plane.

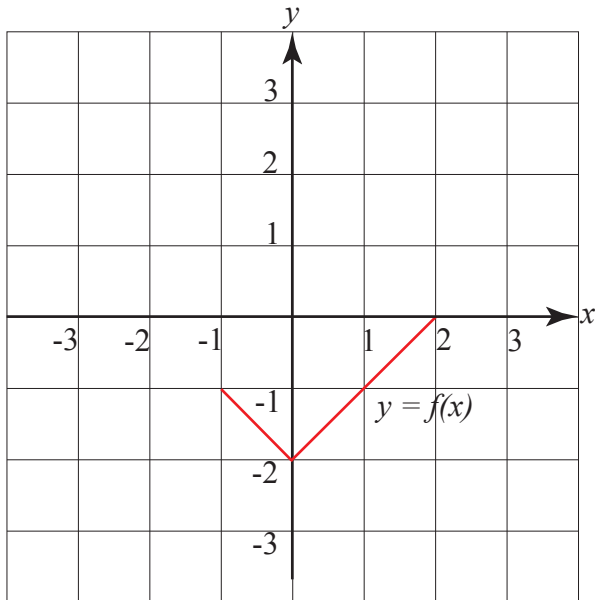


Figure 4

Exercise 8 Sketch the graph of the functions $y = x^2$ and $y = (x - 3)^2 + 1$.