Chapter 1

Functions and Their Graphs

1.1 Functions

Exercises

In Exercises 1–4, compute the indicated values of the given function.

1. $f(x) = 3x^2 + 5x - 2$; $f(0)$, $f(-2)$, $f(1)$.
2. $h(t) = t + \frac{1}{t}$; $h(-1)$, $h(1)$, $h(2)$.
3. $g(u) = \sqrt{u^2 + 2u + 4}$; $g(2)$, $g(0)$, $g(-4)$.
4. $f(t) = (2t - 1)^{3/2}$; $f(1)$, $f(5)$, $f(13)$.

In Exercises 5–9, specify the domain of the given function.

5. $f(x) = 2x^3 - 3x^2 + 5x - 2$;
6. $h(t) = t + \frac{1}{t}$;

7. $f(x) = \sqrt{2x-6}$;
8. $g(u) = \sqrt{u^2+2u+4}$;
9. $f(t) = (2t-1)^{3/2}$
10. Let $g(t) = (t-2)^{1/2}$. Find (if possible) $g(27)$, $g(5)$, $g(2)$ and $g(1)$.
11. Suppose the total cost in euros of manufacturing q units of a certain commodity is given by the function

$$C(q) = q^3 - 30q^2 + 400q + 500.$$

    (a) Compute the cost of manufacturing 20 units of the commodity.

    (b) Compute the cost of manufacturing the 20th unit of the commodity.

12. An efficiency study of the morning shift at a certain factory indicates that an average worker who arrives on the job at 8:00 A.M. will have assembled

$$f(x) = -x^3 + 6x^2 + 15x$$

television sets x hours later.

    (a) How many sets will such a worker have assembled by 11 A.M.? [Hint: At 11 A.M., $x = 3$.]

    (b) How many sets will such a worker have assembled between 9 A.M. and 11 A.M.?

13. Find the composite function $f(g(x))$ for the functions

$$g(u) = u^2 + 2u - 1 \quad \text{and} \quad f(x) = x - 1$$

given in an example in the presentation. Can you conclude if in the general case holds $g(f(x)) = f(g(x))$?

14. A study aiming to determine the manufacturing cost for a certain commodity indicates that the total cost of manufacturing q units of the commodity will be $C(q) = 0.5q + 1$ thousand euros. It is estimated that the number of units manufactured after t working hours will be $q(t) = 0.1t^2$.

(a) Express the total cost ot manufacturing as a function of time (in hours).

(b) When will the manufacturing cost reach 6,800 €?

15. The number S of sales per month is a function of amount a (in euros) spent on advertising per month: $S = f(a)$.

(a) Interpret the statement $f(1{,}000) = 3{,}500$.

(b) If the dependence between S and a is linear (please review the section on systems of two linear equations), which of the graphs in Figure 1.1 is more likely to represent this function?

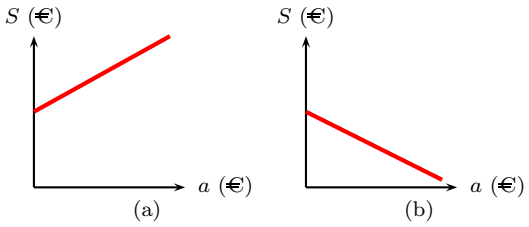

Figure 1.1

(c) What does the y-intercept of the line in the graph represent, in terms of sales and advertising?