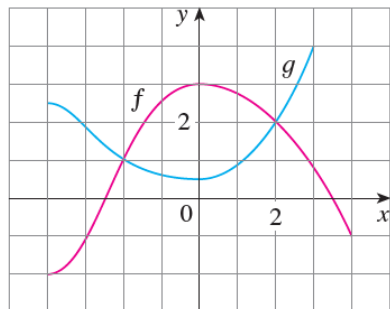


Exercise 1 If

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

is it true that f and g are the same function?

Exercise 2 The graphs of f and g are given.



- (a) State the values of $f(-4)$ and $g(3)$.
- (b) For what values of x is $f(x) = g(x)$?
- (c) Estimate the solution of the equation $f(x) = -1$.
- (d) On what interval is f decreasing?
- (e) State the domain and range of f .
- (f) State the domain and range of g .

Exercise 3 A spherical balloon with radius r inches has volume $V(r) = \frac{4}{3}\pi r^3$. Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r + 1$ inches.

Exercise 4 Evaluate the difference quotient

$$\frac{f(a+h) - f(a)}{h}$$

for the function $f(x) = x^3$. Simplify your answer.

Exercise 5 Evaluate the difference quotient

$$\frac{f(x) - f(1)}{x - 1}$$

for the function $f(x) = \frac{x+3}{x+1}$. Simplify your answer.

Exercise 6 Find the domain of the function.

(a) $f(x) = \frac{2x^3 - 5}{x^2 + x - 6}$

(b) $g(x) = \frac{x^3 - 2}{x^2 + x - 6}$

(c) $h(t) = \sqrt{3 - t} - \sqrt{2 + t}$

(d) $k(u) = \frac{u + 1}{1 + \frac{1}{u+1}}$

(e) $p(x) = \sqrt{4 - x^2}$

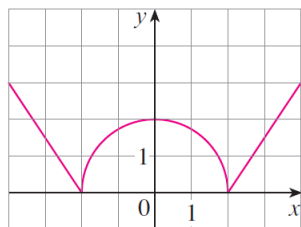
(f) $q(y) = \frac{y^2 - 1}{y + 1}$

Exercise 7 Consider a piecewise defined function

$$f(x) = \begin{cases} -1 & \text{if } x \leq 1 \\ 7 - 2x & \text{if } x > 1 \end{cases}$$

(a) Evaluate $f(-3)$. (c) Evaluate $f(2)$.
 (b) Evaluate $f(1)$. (d) Find the range.

Exercise 8 Find an expression for the function whose graph is the curve below.



Exercise 9 A rectangle has area 16 m^2 . Express the perimeter of the rectangle as a function of the length of one of its sides. State its domain.

Exercise 10 A closed rectangular box with volume 8 ft^3 has length twice the width. Express the height of the box as a function of the width. State its domain.

Exercise 11 Determine whether f is even, odd, or neither.

(a) $f(x) = \frac{x^2}{x^4 + 1}$

(b) $g(x) = x|x|$

(c) $h(x) = 1 + 3x^3 - x^5$

Exercise 12 If f and g are both even functions, is the product fg even? If f and g are both odd functions, is fg odd? What if f is even and g is odd? Justify your answers.