

Introductory Functions

Consider the function defined by the following ordered pairs:

$$F := \left\{ \left(-4, \frac{1}{16}\right), \left(-3, \frac{1}{8}\right), \left(-2, \frac{1}{4}\right), \left(-1, \frac{1}{2}\right), (0, 1), (1, 2), (2, 4), (3, 8), (4, 16) \right\}$$

1. Explain in clear English why this set of ordered pairs defines a function.

2. What is the domain of this function? Write it as a set.

3. What is the range?

4. For the function above, find the following:

(a) $F(-4) =$

(d) $F(-1) =$

(g) $F(2) =$

(b) $F(-3) =$

(e) $F(0) =$

(h) $F(3) =$

(c) $F(-2) =$

(f) $F(1) =$

(i) $F(4) =$

5. Find the following:

(a) $-F(-4) =$

(c) $\frac{F(0)}{F(-3)} =$

(e) $F(-2)F(2) =$

(b) $F(4) + F(2) =$

(d) $F(-3) - F(-4) =$

(f) $\sqrt{F(2)} =$

6. Which of the following set of ordered pair defines a function?

(a) $\{(-2, .01), (-1, .1), (0, 1), (1, 10), (2, 100)\}$

(b) $\{(.01, -2), (.1, -1), (1, 0), (10, 1), (100, 2)\}$

(c) $\{(-3, 9), (-2, 4), (-1, 1), (0, 0), (1, 1), (2, 4), (3, 9)\}$

(d) $\{(9, -3), (4, -2), (1, -1), (0, 0), (1, 1), (4, 2), (9, 3)\}$

(e) $\{(-3, 0), (-2, 0), (-1, 0), (0, 0), (1, 0), (2, 0), (3, 0)\}$

7. Let $f(x) = \frac{x+1}{x-1}$ for $x \neq 1$

Find the following:

(a) $f(2) =$

(c) $\frac{f(2)}{f(-2)} =$

(e) $f\left(\frac{5}{3}\right) =$

(b) $f(-2) =$

(d) $f(4) =$

(f) $f(f(4)) =$

8. Let $g(x) = \begin{cases} 1 - x & \text{for } x \leq 0 \\ x^2 - 1 & \text{otherwise} \end{cases}$

Find the following:

(a) $g(-2) =$ (c) $g(0) =$ (e) $g(2) =$
 (b) $g(-1) =$ (d) $g(1) =$ (f) $g(g(0)) =$

9. Let $h(x) = x^3 - 3x$ for $-4 \leq x < 4$

Find the following:

(a) $h(-3) =$ (e) $h(1) =$ (i) $h(\pi) =$
 (b) $h(-2) =$ (f) $h(2) =$ (j) $h(-\pi) =$
 (c) $h(-1) =$ (g) $h(3) =$ (k) $h(h(-1)) =$
 (d) $h(0) =$ (h) $h(4) =$ Careful! (l) $\frac{h(3)}{3} =$

10. Let $G(x) = \sqrt{1 - x^2}$ for $-1 \leq x \leq 1$

Find the following:

(a) $G(-1)$ (c) $G(-\frac{3}{5})$ (e) $G(\frac{\sqrt{2}}{2})$
 (b) $G(\frac{4}{5})$ (d) $G(\frac{\sqrt{3}}{2})$ (f) $G(\frac{1}{2})$

11. Let $A(x) = \frac{|x|}{x}$ for $x \neq 0$

(a) $A(-3)$ (d) $A(1)$ (g) $A(72)$
 (b) $A(-2)$ (e) $A(2)$ (h) $A(-\pi)$
 (c) $A(-1)$ (f) $A(3)$ (i) $A(\pi)$

12. How would you describe A in plain English?