Key

Exercise Set 1.1: An Introduction to Functions

Find the domain of each of the following functions. Then express your answer in interval notation.

1. $f(x)=\frac{5}{x-3}$ $(-\infty,3)\cup(3,\infty)$

2. $f(x)=\frac{x-6}{x+1}$ $(-\infty,-1)\cup(-1,\infty)$

3. $g(x)=\frac{x-4}{x^2-9}$ $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$

4. $f(x)=\frac{3x+1}{x^2+4}$ $(-\infty,\infty)$

5. $f(x)=\frac{x^2+6x+5}{x^2-11x+28}$ $(-\infty,4)\cup(4,7)\cup(7,\infty)$
   $(x-7)(x-4)$

6. $g(x)=\frac{3x+15}{x^2+8x-20}$ $(-\infty,-10)\cup(-10,2)\cup(2,\infty)$
   $(x+10)(x-2)$

7. $f(x)=\frac{2}{\sqrt{x-4}}$ $(4,\infty)$
   $x>4$

8. $f(x)=\sqrt{x-5}$ $[5,\infty)$

9. $g(x)=\sqrt{x+7}$ $[-7,\infty)$

10. $F(x)=\frac{\sqrt{3-2x}}{x+4}$ $x\le\frac{3}{2}$ and $x\neq-4$

11. $G(x)=\frac{\sqrt{x-3}}{x-7}$ $x\ge3$ and $x\neq7$

12. $g(x)=\frac{-3}{\sqrt{x^2-4}}$ $(-\infty,-2)\cup(2,\infty)$
    $+ \quad - \quad +$
    $-2 \quad 2$

13. $f(x)=|x^2-4|$ $(-\infty,\infty)$

Evaluate the following.

14. If $f(x)=5x-4$, find:

$f(3),\ f\left(-\frac{1}{2}\right),\ f(a),\ f(a+3),\ f(a)+3,\ f(a)+f(3)$

$11,\ \frac{-13}{2},\ 5a-4,\ 5a+11,\ 5a-1,\ 5a+7$

15. If $f(x)=\frac{2+x}{x-3}$, find:

$f(-7),\ f(0),\ f\left(\frac{3}{5}\right),\ f(t),\ f(t^2-3)$

$\frac{1}{2},\ -\frac{2}{3},\ \frac{-13}{12}$

$\frac{2+t}{t-3},\ \frac{t^2-1}{t^2-6}$

16. If $g(x)=x^2-3x+4$, find:

$g(0),\ g\left(-\frac{1}{4}\right),\ g(x+5),\ g\left(\frac{1}{a}\right),\ g(3a),\ 3g(a)$

$4,\ \frac{77}{16},\ x^2+7x+14,$

$\frac{4a^2-3a+1}{a^2},\ 9a^2-9a+4,\ 3a^2-9a+12$

Transformations of Functions – Extra Practice

Write an equation for a function that has a graph with the given characteristics.

1. The shape of $y = x^2$ but is shifted left 3 units $y=(x+3)^2$

2. The shape of $y = \sqrt{x}$ but upside down and shifted right 3 units and up 4 units. $y = -\sqrt{x-3}+4$

3. The shape of $y = |x|$ but stretched vertically by a factor of 2 and shifted right 3 units. $y = 2|x-3|$

4. The shape of $y = x^2$ but upside-down and shifted right 8 units $y = -(x-8)^2$

5. The shape of $y = |x|$ but stretched horizontally by a factor of 2 and shifted down 5 units $y = |\frac{1}{2}x| - 5$

6. The shape of $y = x^3$ but reflected across the x-axis and shifted up 1 unit. $y = -x^3 + 1$

7. The shape of $y = \sqrt{x}$ but reflected across the y axis, shifted down 2, and left 4. $y = \sqrt{-x+4} - 2$

8. The shape of $y = x^2$ but compressed vertically by a factor of 2 and shifted up 6. $y = \frac{1}{2}x^2 + 6$