MATH121
Domain and Range—Graphically and Algebraically

In problems 1-11, find the domain and range of the function whose graph is shown.

1.
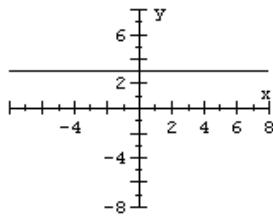
2.
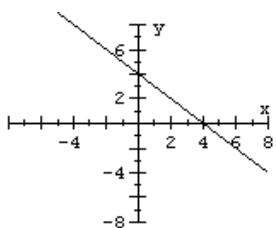
3.
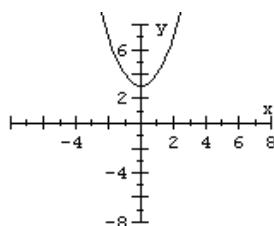
4.
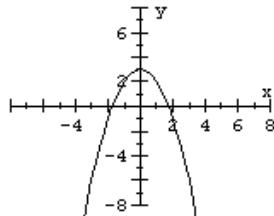
5.
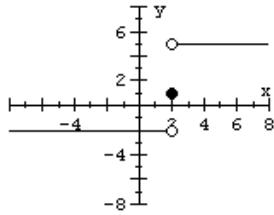
6.
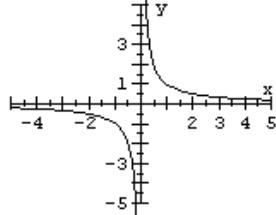
7.
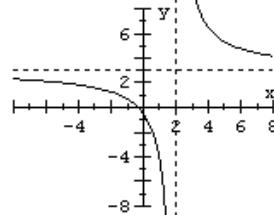
8.
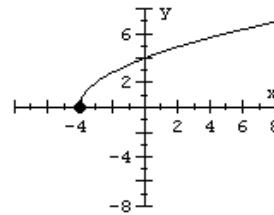
9.
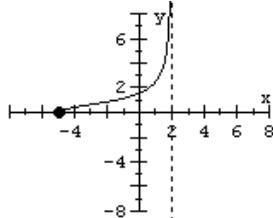
10.
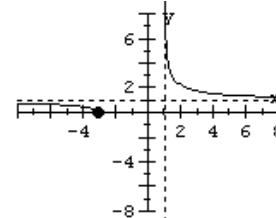
11.
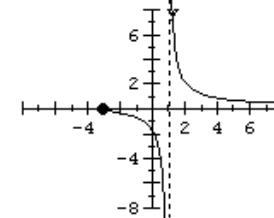
In problems 12-21, find the domain and range.

12. $\{(3,1),(-1,5),(2,5)\}$

13. $\{(x, x^2 - 4)\}$

14. $\{(x, y) | y = \sqrt{x-3}\}$

15. $\{(x,4)\}$

16. $\{(x, y) | y = 3 - \sqrt{x}\}$

17. $f(x) = |x+4|$

18. $f(x) = \begin{cases} 1 & \text{if } x < 0 \\ 3 & \text{if } x = 0 \\ 5 & \text{if } x > 0 \end{cases}$

19. $f(x) = \begin{cases} 2x-2 & \text{if } x < 3 \\ 7-x & \text{if } x \geq 3 \end{cases}$

20. $f(x) = \dfrac{x-1}{x-1}$

21. $f(x) = \dfrac{x^2 - 1}{x+1}$

In problems 22-28, find the domain.

22. $f(x) = \dfrac{x+5}{\sqrt{1-x}}$

23. $f(x) = \dfrac{x-4}{\sqrt{2x+6}}$

24. $f(x) = \dfrac{\sqrt{x+4}}{x-1}$

25. $f(x) = \dfrac{\sqrt{x+2}}{x-4}$

26. $f(x) = \sqrt{\dfrac{x+6}{2x+1}}$

27. $f(x) = \sqrt{\dfrac{x+3}{1-x}}$

28. $f(x) = \sqrt{\dfrac{4-x}{2x+5}}$

Answers: (Note: $\Re$ is the set of real numbers so that writing $\Re - \{0\}$ is the same as writing $(-\infty, 0) \cup (0, \infty)$)

1. $D = \Re$, $R = \{3\}$
2. $D = \Re$, $R = \Re$
3. $D = \Re$, $R = [3, \infty)$
4. $D = \Re$, $R = (-\infty, 3]$
5. $D = \Re$, $\{-2, 1, 5\}$
6. $D = \Re - \{0\}$, $R = \Re - \{0\}$
7. $D = \Re - \{2\}$, $R = \Re - \{3\}$
8. $D = [-4, \infty)$, $R = [0, \infty)$
9. $D = [-5, 2)$, $R = [0, \infty)$
10. $D = (-\infty, -3] \cup (2, \infty)$, $R = [0, 1) \cup (1, \infty)$
11. $D = [-3, 1) \cup (1, \infty)$, $R = \Re$
12. $D = \{-1, 2, 3\}$, $R = 1, 5$
13. $D = \Re$, $R = [-4, \infty)$
14. $D = [3, \infty)$, $R = [0, \infty)$
15. $D = \Re$, $R = \{4\}$

16. $D = [0, \infty)$, $R = (-\infty, 3]$
17. $D = \Re$, $R = [0, \infty)$
18. $D = \Re$, $R = \{1, 3, 5\}$
19. $D = \Re$, $R = (-\infty, 4]$
20. $D = \Re - \{1\}$, $R = \{1\}$
21. $D = \Re - \{-1\}$, $R = \Re - \{-2\}$
22. $D = (-\infty, 1)$
23. $D = (-3, \infty)$
24. $D = [-4, 1) \cup (1, \infty)$
25. $D = [-2, 4) \cup (4, \infty)$
26. $D = (-\infty, -6] \cup \left(-\dfrac{1}{2}, \infty\right)$
27. $D = [-3, 1)$
28. $D = \left(-\dfrac{5}{2}, 4\right]$