Function Review Worksheet

Math Tutorial Lab Special Topic*

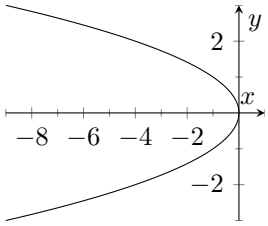
Example Problems

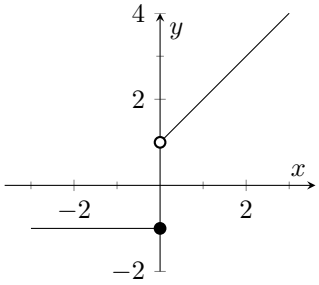
Evaluate the following functions:

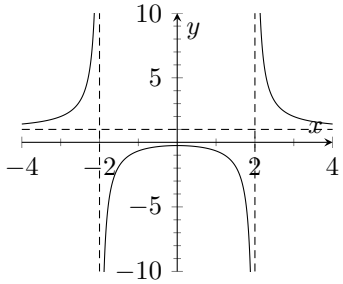
1. If $f(x) = x^2 - 2x + 1$, find
   (a) $f(2)$
   (b) $f(\sqrt{5})$
   (c) $f(-1 + \sqrt{2})$
   (d) $f(2w + 1)$

2. If $f(x) = \sqrt{x + 4}$, find
   (a) $f(-1)$
   (b) $f(a)$
   (c) $f(x + h)$
   (d) $f(\text{☺})$

Determine which of the curves are graphs of functions. For the graphs that are functions, find the domain and range.

3. 

4. 

5. 

Find the domain and range of each function.

6. $f(x) = 2x + 1$
7. $f(x) = 3x^2 - 2$
8. $f(x) = \frac{x^2}{x^2+1}$
9. $f(x) = \frac{x}{x-1}$
10. $f(x) = \sqrt{1 - x}$
11. $f(x) = \sqrt{x^2 - 9}$
12. $f(x) = \sqrt{\frac{x-2}{x-1}}$
13. $f(x) = \sqrt{x^2 - x - 2}$
14. $f(x) = \begin{cases} x^3, & \text{if } x \geq 0 \\ -2x, & \text{if } x < 0. \end{cases}$

Find $f + g, f - g, f \cdot g$, and f/g.

15. $f(x) = \frac{1}{x}; g(x) = \frac{x}{x-2}$
16. $f(x) = \sqrt{x + 1}; g(x) = \sqrt{3 - x}$

Find $f \circ g$ and $g \circ f$.

17. $f(x) = \sqrt{x - 1}; g(x) = x^2 - 3$
18. $f(x) = \frac{1}{x}; g(x) = \frac{1}{x+1}$

*Created by Maria Gommel, June 2014.

Answers

1. (a) 1
   (b) $6 - 2\sqrt{5}$
   (c) $6 - 4\sqrt{2}$
   (d) $4w^2$
2. (a) $\sqrt{3}$
   (b) $\sqrt{a+4}$
   (c) $\sqrt{x+h+4}$
   (d) $\sqrt{\☺+4}$
3. Not a function
4. Is a function. Domain: $(-\infty, \infty)$, Range: $\{-1\} \cup (1, \infty)$
5. Is a function. Domain: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$, Range: $(-\infty, 0) \cup (1, \infty)$.
6. Domain: $(-\infty, \infty)$, Range: $(-\infty, \infty)$
7. Domain: $(-\infty, \infty)$, Range: $[-2, \infty)$
8. Domain: $(-\infty, \infty)$, Range: $[0, 1)$
9. Domain: $(-\infty, 1) \cup (1, \infty)$, Range: $(-\infty, 1) \cup (1, \infty)$
10. Domain: $(-\infty, 1]$, Range: $[0, \infty)$
11. Domain: $(-\infty, -3] \cup [3, \infty)$, Range: $[0, \infty)$
12. Domain: $(-\infty, 1) \cup (2, \infty)$, Range: $[0, 1) \cup (1, \infty)$
13. Domain: $(-\infty, -1] \cup [2, \infty)$, Range: $[0, \infty)$
14. Domain: $(-\infty, \infty)$, Range: $[0, \infty)$
15. $(f+g)(x) = \frac{1}{x} + \frac{x}{x-2}; (f-g)(x) = \frac{1}{x} - \frac{x}{x-2}; (f \cdot g)(x) = \frac{1}{x-2}; (f/g)(x) = \frac{x-2}{x^2}$
16. $(f+g)(x) = \sqrt{x+1} + \sqrt{3-x}; (f-g)(x) = \sqrt{x+1} - \sqrt{3-x}; (f \cdot g)(x) = \sqrt{3+2x-x^2}; (f/g)(x) = \frac{\sqrt{x+1}}{\sqrt{3-x}}$
17. $(f \circ g)(x) = \sqrt{x^2-4}, (g \circ f)(x) = x - 4$
18. $(f \circ g)(x) = x + 1, (g \circ f)(x) = \frac{x}{x+1}$