1. [10 pts.] Find $f(-3)$ and $f(x+1)$ for
$$f(x) = \sqrt{x^2 + x}.$$

2. [10 pts. each] Give the domain of each function in interval notation.

(a) $q(t) = \dfrac{3t - 4}{\sqrt{t - 8}}$

(b) $h(x) = \dfrac{\sqrt{2x}}{5x - 2}$

3. [10 pts. each] Let
$$f(x) = 1 + \frac{1}{2x} \quad \text{and} \quad g(x) = \frac{x+2}{x+4}.$$

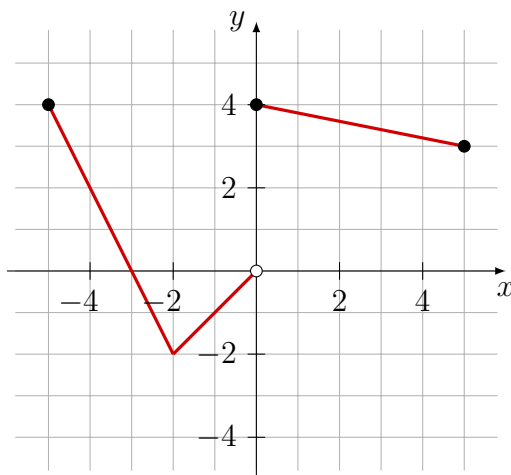(a) Find $(f \cdot g)(x)$ and its domain.

(b) Find $\left(\dfrac{f}{g}\right)(x)$ and its domain.

4. [5 pts. each] Determine algebraically whether the function is even, odd, or neither.

(a) $f(x) = x^3 - 10$

(b) $g(x) = \dfrac{x^3}{3x^5 - 9x}$

5. [10 pts.] A piecewise-defined function f has graph below. Write a definition for f.

6. A wire 10 meters long is to be cut into two pieces. One piece will be shaped as a square, and the other piece will be shaped as a circle.

   (a) [10 pts.] Express the total area A enclosed by the pieces of wire as a function of the length x of a side of the square.

   (b) [5 pts.] What is the domain of A?

7. [10 pts.] Find the zeros of
$$G(x) = x(x + 8) + 12.$$
What are the x-intercepts of the graph of the function?

8. [10 pts.] Find all complex zeros of
$$H(x) = x^6 - 9x^3 + 8.$$

9. [10 pts.] Solve the inequality $2x^2 < 3 + 5x$, giving the solution set in interval notation.

10. [15 pts.] A track and field playing area is in the shape of a rectangle with semicircles at each end. The inside perimeter of the track is to be 1500 meters. What should the dimensions of the rectangle be so that the area of the rectangle is a maximum?

11. [10 pts.] Solve the equation $|3t - 4| + 6 = 11$.

12. [10 pts.] Solve the inequality $5 - |x + 5| < -10$, giving the solution set in interval notation.