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

2. 10 pts. each Find the domain of each function.

(a) $g(x) = \dfrac{x - 2}{3 - 4x}$

(b) $h(t) = \dfrac{\sqrt{t - 4}}{3t - 21}$

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

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

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

4. 3 pts. each Let $p(x) = -3x^2 + 5x$.
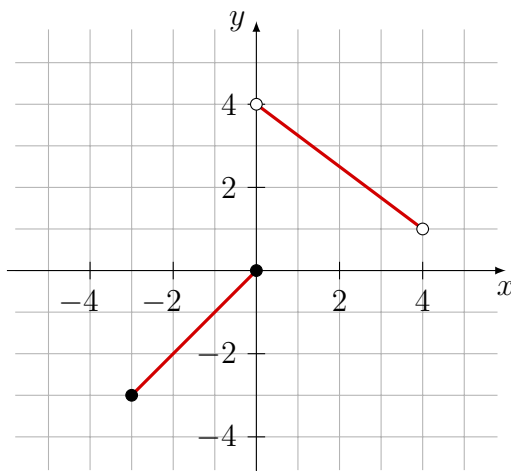
(a) Is the point $(-1, 2)$ on the graph of p?

(b) Find x if $p(x) = -2$.

(c) Find the domain of p.

(d) Find the y-intercept of p.

(e) What are the zeros of p?

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

6. [10 pts.] A rectangle is inscribed in a circle of radius 2, as shown below. Let $P = (x, y)$ be the point in Quadrant I that is a vertex of the rectangle and is on the circle.

(a) Express the area A of the rectangle as a function of x.

(b) Express the perimeter p of the rectangle as a function of x.
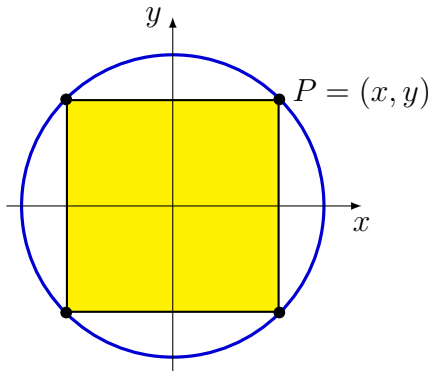
7. [10 pts.] Find the points of intersection of the graphs of the functions

$$f(x) = x^2 + 5x - 3 \quad \text{and} \quad g(x) = 2x^2 + 7x - 27.$$

8. [10 pts.] Consider the quadratic function $H(x) = 3x^2 + x - \frac{1}{2}$. Find the zeros of H by completing the square. What are the x-intercepts of the function's graph, if any?

9. [10 pts.] Solve the inequality $2x^2 + 4x \geq x^2 - x - 6$, giving the solution set in interval notation.

10. [15 pts.] A suspension bridge with weight uniformly distributed along its length has twin towers that extend 75 meters above the road surface and are 400 meters apart. The cables are parabolic in shape and are suspended from the tops of the towers in such a way that they touch the pavement at the center of the bridge. Assuming the bridge is level, find the height of the cables at the points 100 meters from the center.

11. [10 pts.] Solve the equation $|4 - 5t| - 5 = 14$.

12. [10 pts.] Solve the inequality $5 - |y - 1| < -2$.