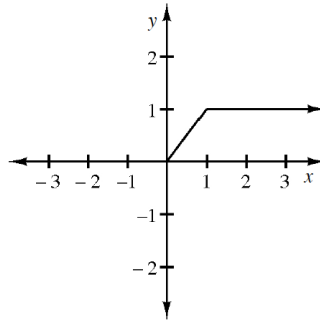
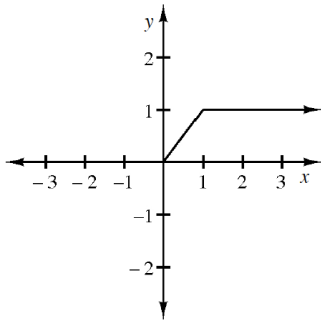


# Homework #15

First & Last Name: \_\_\_\_\_ Class: \_\_\_\_\_

For homework to be graded, it must be *fully completed*. This means you must **show your work**.

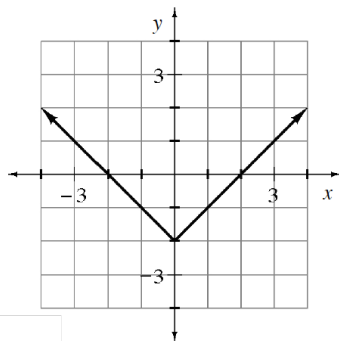
1. A portion of the graph of  $y = f(x)$  is given below. [Desmos](https://www.desmos.com/calculator/zting49b9j) (desmos.com/calculator/zting49b9j).



- Sketch the rest of the graph if  $f$  is even and calculate the area under the curve for  $-3 \leq x \leq 3$ .
  - Sketch the rest of the graph if  $f$  is odd and calculate the area under the curve for  $-3 \leq x \leq 3$ .
2. What value of  $a$  will make  $h$  continuous?

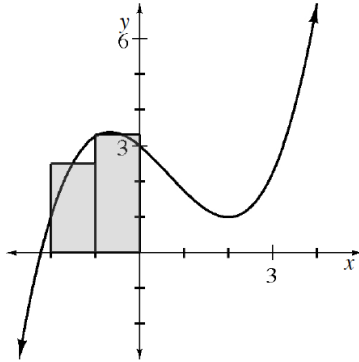
$$h(x) = \begin{cases} \sqrt{x+2} - 1 & \text{for } x < 2 \\ a(x+1)^2 & \text{for } x \geq 2 \end{cases}$$

3. The graph of  $y = f(x)$  is sketched below.



- Sketch  $y = f(-x)$ .
  - Sketch  $y = -f(x)$ .
  - [Challenge]** Sketch  $y = f(f(x))$ .
4. State the domain of each of the following functions. Note: The functions mentioned in parts (c) and (d) refer to those in parts (a) and (b).
- $f(x) = \frac{1}{x+2}$
  - $g(x) = \sqrt{x-4}$
  - [Challenge]**  $h(x) = f(g(x))$
  - [Challenge]**  $k(x) = g(f(x))$
5. For each function, use algebra to identify all holes and asymptotes.
- $f(x) = \frac{x-3}{x^2+4x-21}$
  - $g(x) = \frac{x^{4/3}}{x^2-2x}$
6. Velocity is only one example of a rate of change. Name at least two other familiar rates that you encounter in your daily life.

7. Let  $f$  be a function whose finite differences grow by 4. What kind of function can  $f$  be? Give two examples.
8. Cynthia began to draw midpoint rectangles to approximate the area under the curve for  $-2 \leq x \leq 4$  given  $f(x) = \frac{1}{4}x^3 - \frac{1}{2}x^2 - x + 3$ . Redraw Cynthia's graph and finish drawing the remaining four midpoint rectangles. Then, compute the estimated area.



9. Each of the functions below has one or more holes and/or asymptotes. Graph the functions in Desmos and write a complete set of approach statements for each function.
- a.  $f(x) = \frac{2^x}{x}$
- b.  $g(x) = \frac{2^x - 1}{x}$