

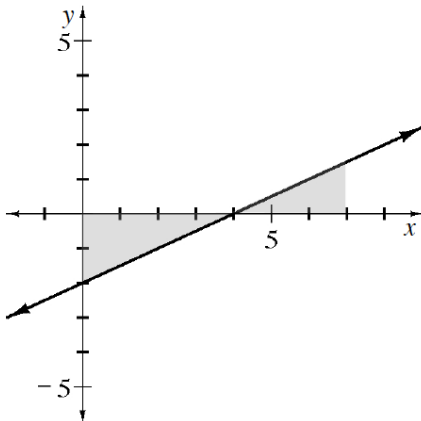
## Homework #10

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

Class: \_\_\_\_\_

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

- Are the following functions even, odd, or neither?
  - $y = x^{1/3}$
  - $y = -x^2 + 4$
  - $y = x^3 + x^2 + 1$
- If  $f(x) = x^2 + 5x$  and  $g(x) = x + 3$ , evaluate each of the following expressions.
  - $f(-2)$
  - $g(-2)$
  - $f(g(-2))$
  - $g(f(-2))$
  - $f(f(-2))$
  - $g(g(-2))$
- Examine the graph of  $f(x) = 0.5x - 2$  below.



- Calculate the area of the shaded region using geometry. (Recall that area below the  $x$ -axis is considered negative.)
  - [Challenge]** What is the value of  $k$  if the area under the curve for  $0 \leq x \leq k$  is 10?
- Graph  $f(x) = 2x + \frac{1}{x}$ . What is the end-behavior function? [Desmos](https://www.desmos.com/calculator/t3mwavtn0t) (desmos.com/calculator/t3mwavtn0t).
  - A flag is defined by the region between the  $x$ -axis and:
 
$$f(x) = \begin{cases} -x + 5 & \text{for } 1 \leq x \leq 3 \\ 2 & \text{for } 3 < x \leq 6 \end{cases}$$
 Calculate the volume generated when the flag is rotated about the  $x$ -axis. [Desmos](https://www.desmos.com/calculator/q6exaaa0qq) (desmos.com/calculator/q6exaaa0qq).
  - Review the directions for writing approach statements in the Math Notes box in Lesson 1.2.3. Then write a complete set of approach statements for  $y = 3^{-x} + 1$ . [Desmos](https://www.desmos.com/calculator/g9a2p8gxhg) (desmos.com/calculator/g9a2p8gxhg).
  - If  $y = \frac{x}{x+1}$ , approximate the area under the curve for  $0 \leq x \leq 4$  using eight left endpoint rectangles of equal width. [Desmos](https://www.desmos.com/calculator/itb7q9rmgj) (desmos.com/calculator/itb7q9rmgj).
  - If  $f(x) = x^2 + 5$  and  $g(x) = x + 3$ , write and simplify expressions for the function operations given below.
    - $f(g(x))$
    - $g(f(x))$
    - $f^{-1}(-6)$

d.  $g^{-1}(-6)$

9. **[Challenge]** Without a calculator, sketch each graph, showing roots, holes, and asymptotes. Then, state the domain in parts (a) and (b) using interval notation and the domain in parts (c) and (d) using set notation.

[Desmos](https://www.desmos.com/calculator/e2vfx5mprs) ([desmos.com/calculator/e2vfx5mprs](https://www.desmos.com/calculator/e2vfx5mprs)).

a.  $y = \frac{x^2-4}{x^3+3x^2-10x}$

b.  $y = \frac{9-x^2}{2x+6}$

c.  $y = \frac{x^2-9x-18}{x^2+3x-18}$

d.  $y = \frac{x^2-6x+9}{15-5x}$

10. The domain of a function  $f$  is  $x > 0$ . The range of  $f$  is  $-2 < y \leq 5$ .

a. Sketch a possible graph of  $f$ .

b. **[Challenge]** What are the domain and range of  $y = f(x - 2) + 1$ ?

c. **[Challenge]** What are the domain and range of  $f^{-1}$ ?