

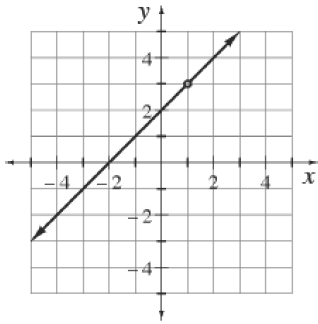
Homework #8

First & Last Name: _____

Class: _____

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

1. Analyze the graph of $y = \frac{(x+2)(x-1)}{x-1}$ shown below.



- What does y approach as $x \rightarrow \infty$? What does y approach as $x \rightarrow -\infty$? Describe how your answer can be predicted from the given equation.
 - What does y approach as $x \rightarrow 1^-$ (1 from the left)? What does y approach as $x \rightarrow 1^+$ (1 from the right)? Describe how your answer can be predicted from the given equation.
2. Write the equation of a function that has the following complete set of approach statements. Hint: Start by sketching the graph. [Desmos](https://www.desmos.com/calculator/uwessl7ejq) ([desmos.com/calculator/uwessl7ejq](https://www.desmos.com/calculator/uwessl7ejq)).

$$\text{As } x \rightarrow 3^+, y \rightarrow \infty.$$

$$\text{As } x \rightarrow 3^-, y \rightarrow -\infty.$$

$$\text{As } x \rightarrow -\infty, y \rightarrow 1.$$

$$\text{As } x \rightarrow \infty, y \rightarrow 1.$$

3. Convert the following domain and range from interval notation to set notation. Then sketch a possible function with the given domain and range.

$$D = (-\infty, 2) \cup (2, \infty) \quad R = (-\infty, -1) \cup (-1, \infty)$$

4. On graph paper, sketch the function $g(x) = \sqrt{36 - x^2}$. Shade the area under the curve for $3 \leq x \leq 6$. [Desmos](https://www.desmos.com/calculator/g2cgpj3hxb) ([desmos.com/calculator/g2cgpj3hxb](https://www.desmos.com/calculator/g2cgpj3hxb)).

- Use geometry to calculate this area. Hint: Draw in a radius to create two easier regions whose difference is the shaded region.
 - Calculate the area under the curve for $0 \leq x \leq 3$.
 - Calculate the area under the curve for $-3 \leq x \leq 6$.
5. A marathon runner runs a 26.2-mile race. Her distance traveled in miles after t hours is $p(t) = 7t$.
- How long does it take her to finish the race?
 - What is her average velocity? Explain your reasoning.
 - Suppose she runs at a constant pace of 7 miles/hour. How far will she have gone in 2 hours?
 - Show how the units in your answer to part (c) reduce using $(\text{rate})(\text{time}) = \text{distance}$.

6. Wei Kit loves patterns! When making calculations with rational exponents, he looks for a way to avoid using his calculator. For example, he knows that $8^{2/3} = 4$ by using the method below:

$$8^{2/3} = \left(\sqrt[3]{8}\right)^2 = (2)^2 = 4$$

Use Wei Kit's method to evaluate the following expressions:

- $100^{3/2}$
- $27^{4/3}$

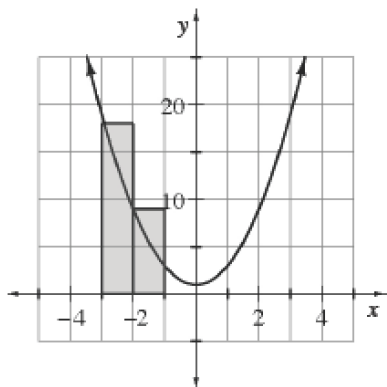
- c. $16^{3/4}$
- d. $9^{4/2}$

7. Sketch a graph of $y = 1 - x^3$. Then complete the following approach statements.

[Desmos](https://www.desmos.com/calculator/bxfbwufg3w) (desmos.com/calculator/bxfbwufg3w).

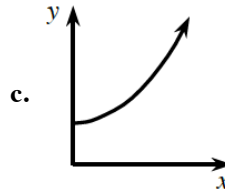
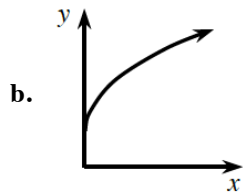
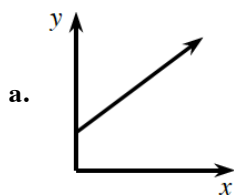
- a. As $x \rightarrow \infty$, y approaches?
- b. As $x \rightarrow -\infty$, y approaches?
- c. As $x \rightarrow 0^-$ (0 from the left), y approaches?

8. If for $f(x) = 2x^2 + 1$, estimate the area under the curve for $-3 \leq x \leq 3$ as follows.

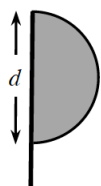


- a. Using six left endpoint rectangles. The first two rectangles are drawn for you.
 - b. Using six right endpoint rectangles.
 - c. Using six trapezoids. What do you notice? Does this always happen?
9. Each of the continuous functions in the table below is increasing, but each increases differently. Match each graph below with the function that grows in a similar fashion in the table. [Desmos](https://www.desmos.com/calculator/tqfoqrvap) (desmos.com/calculator/tqfoqrvap).

x	1	2	3	4	5	6	7	8	9
$f(x)$	64	68.8	74.6	81.5	89.8	99.7	111.7	126	143
$g(x)$	38	52	66	80	94	108	122	136	150
$h(x)$	22	42.9	57.3	68.5	77.6	85.3	92	97.9	103.1



10. When the semi-circular flag below is rotated, it has a volume of $\frac{243}{2} \pi \text{ in}^3$.



- a. Describe the resulting three-dimensional figure.
- b. What is the value of d ?
- c. If the diagram is rotated 90° and the flag is then rotated about a horizontal pole, will the volume change?