

# Homework #24

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

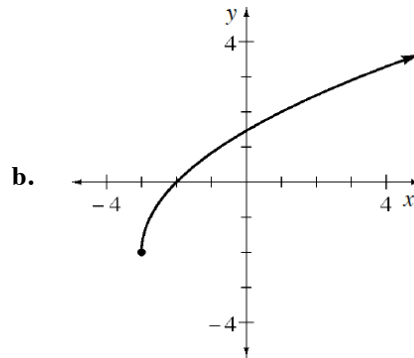
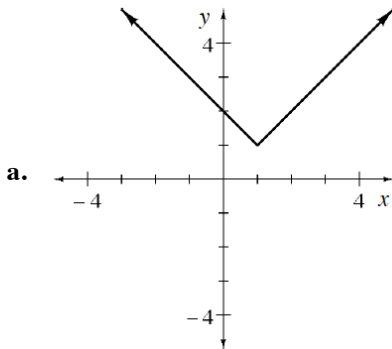
Class: \_\_\_\_\_

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

- Kimberly is always complaining that it is either too hot or too cold. As a matter of fact, she is so picky that she is only happy when it is exactly 72°F. At 8:00 a.m. it is 65°F. By 3:00 p.m. it is 90°.
  - Is there a time when Kimberly is happy?
  - If at 6:00 p.m. the temp is 70°F, what is the minimum number of times Kimberly was happy today?
- A mug of hot coffee is poured and then set on the counter.
  - Sketch a feasible graph showing the temperature of the coffee as a function of time. Do not worry about units, just show the general behavior of the graph.
  - Evaluate the following limit and translate the entire limit statement into a complete sentence.

$$\lim_{x \rightarrow \infty} (\text{temperature}) =$$

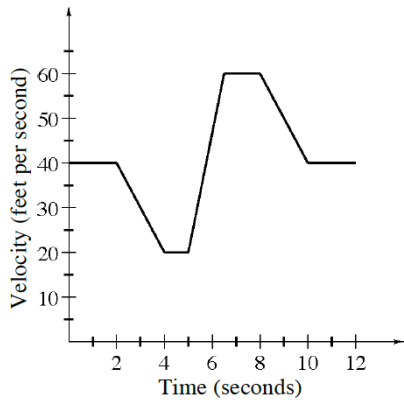
- Using set notation, state the domain and range for each of the functions below.



- Sketch one function that satisfies all of the following conditions. Does your graph have any asymptotes?
  - $\lim_{x \rightarrow -\infty} f(x) = 2$
  - $\lim_{x \rightarrow 3^-} f(x) = -4$
  - $\lim_{x \rightarrow 3^+} f(x) = 1$
  - $\lim_{x \rightarrow \infty} f(x) = -2$
- If you plot the finite differences of a parabola, the result will be what type of function?
- Using sigma notation, write a Riemann sum to estimate the area under the function  $f(x) = x \cos(x)$  for  $-2 \leq x \leq 6$  with eight left endpoint rectangles of equal width. Then use the summation feature of Desmos to calculate the estimated area.
- Alter your sigma notation from problem 6 to estimate the area with 16 rectangles and use it to approximate the area. Were your results the same?
- If  $f(x) = \frac{x-3}{x+5}$ , evaluate:
  - $\lim_{x \rightarrow \infty} f(x)$
  - $\lim_{x \rightarrow -\infty} f(x)$
  - $\lim_{x \rightarrow -5} f(x)$
  - [Challenge]**  $f(x - 5)$
  - [Challenge]**  $f(2m + 3)$

f. [Challenge] For parts (a) and (b), explain the graphical significance of  $\lim_{x \rightarrow \infty} f(x)$  and  $\lim_{x \rightarrow -\infty} f(x)$ .

9. Tiffany has an old car that she is constantly repairing. One day, she is driving to school when she starts having problems with the car's fuel injection system. Her velocity (in feet per second) is shown below.



- Recall that acceleration is the rate of change of velocity. How is acceleration represented on a velocity graph?
- When is her acceleration negative?
- What is her maximum acceleration?
- Describe the motion of the vehicle when the acceleration is zero.
- How far does Tiffany travel during the 12 seconds shown in the graph?