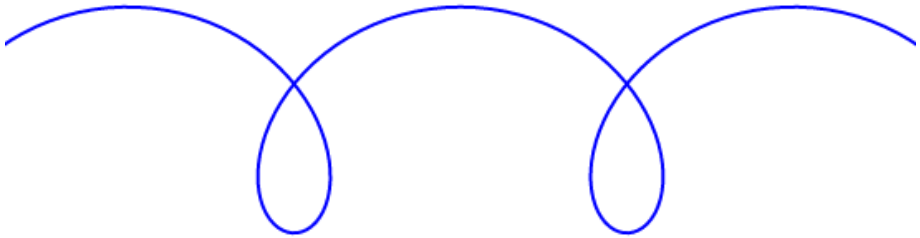
MAT137 - Week 9, Lecture 1

- **Reminder:** Problem Set 3 is available on the course website, and is due **this Thursday**.
  - Don't leave the submission process until the last minute.
- Today's lecture will assume you have watched up to and including video 4.2.

  For Thursday's lecture, watch videos 4.3 through 4.5.
- Finish the exercise on the last slide for homework.

A worm function

A worm is crawling across a table. The path of the worm looks something like this:

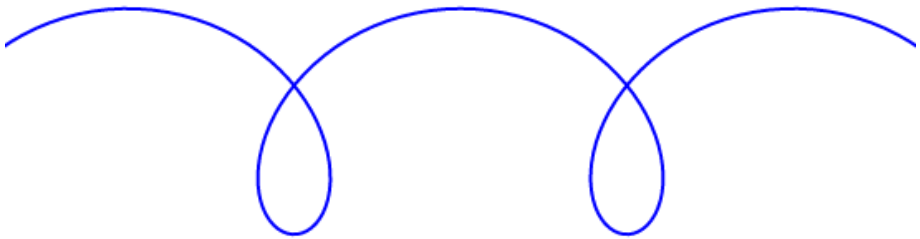


True or False? The position of the worm is a function of time.

A worm function (part 2)

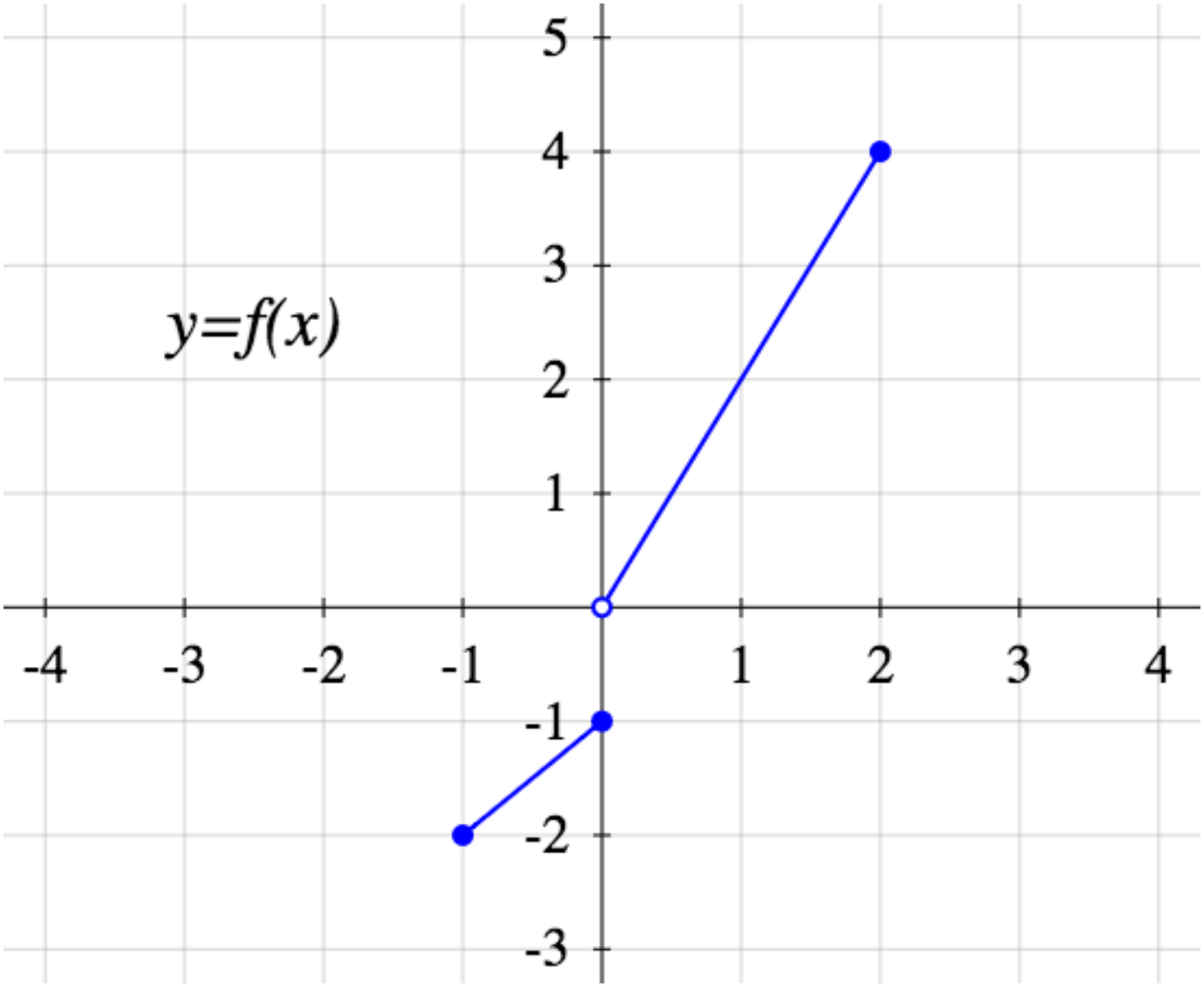
A worm is crawling accross the table. Let f be the function that describes its position.

That is, for time t, let $f(t)$ be the position of the worm.



1. What is the domain of f?
2. What is the codomain of f?
3. What is the range of f?

Inverses from a graph

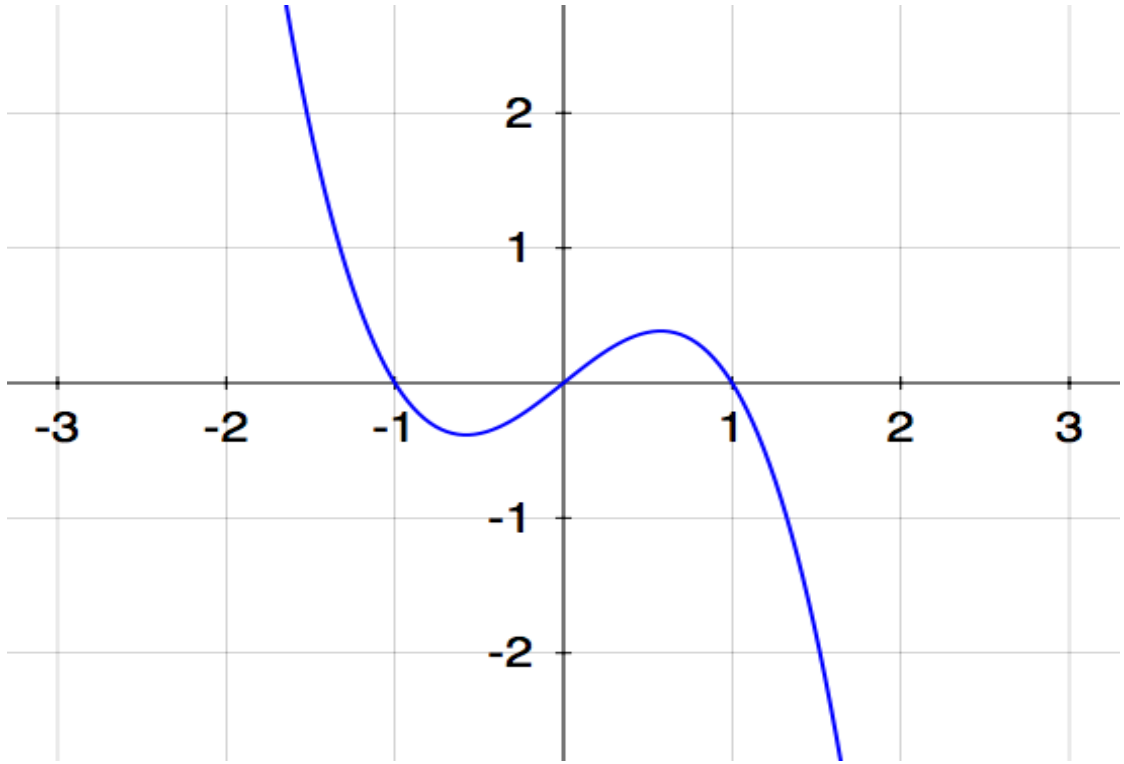


Compute:

1. $f(2)$
2. $f(0)$
3. $f^{-1}(2)$
4. $f^{-1}(0)$
5. $f^{-1}(-1)$

Inverses

Let f be the function whose graph is shown here:



1. What is the largest interval containing -1 on which f has an inverse?
2. What is the largest interval containing 0 on which f has an inverse?

Try to sketch the graphs of these two inverses.

Absolute values and inverses

Let h be the function defined by

$$h(x) = x|x| + 1.$$

1. Sketch the graph of h.
2. What are the domain, codomain, and range of h?
3. Does h have an inverse?
4. Compute $h^{-1}(-8)$.
5. Find an equation for $h^{-1}(x)$.
6. Use your equation to verify that:
   - for all $x \in \mathbb{R}$, $h(h^{-1}(x)) = x$
   - for all $x \in \mathbb{R}$, $h^{-1}(h(x)) = x$