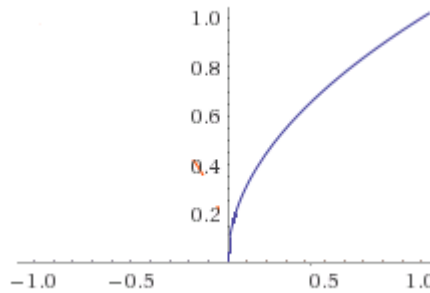


## MATH 1 Homework 2

Assigned September 21st, due September 28th

- You're riding a bike and want to see how fast you can go. After 2 seconds you've gone 1 meter, after 4 seconds you've gone 5 meters, and after 10 seconds you've gone 20 meters. Use Lagrange interpolation to find a polynomial that fits these data points, and then use that polynomial to predict how far you will have gone in 15 seconds. (Leave the polynomial unsimplified and use a calculator to evaluate).
  - Use a graphing tool to find the plot of your polynomial that you got in part (a). Sketch the plot. Does this model make sense? Why or why not?
- Let  $f$  be a function with domain  $[2, 3]$  and range  $[-1, 2]$ . Give the domain and range of the following functions:
  - $f(3x + 2) + 3$
  - $4f(-x + 1) - 1$
  - $-2f(x + 1) + 1$
- Below is the graph of a function  $f$ :



- Describe the transformations needed to draw the graph of  $-f(x - 5) + 2$ . What order do the transformations need to be performed in?
  - Sketch the graph of  $-f(x - 5) + 2$ .
  - Why does the order matter? What would happen if you did the transformations in a different order?
- For the following functions, decompose into the given number of nonidentity functions.
    - Write  $\sqrt[3]{x^2 + 4x + 4}$  as the composition of two nonidentity functions.
    - Write  $\sqrt[3]{x^2 + 4x + 4}$  as the composition of three nonidentity functions.
    - Write  $\sqrt{x + 34x^2}$  as the composition of two nonidentity functions.
    - Write  $-f(x - 5) + 2$  as the composition of three nonidentity functions.
  - Sketch the graphs of the following functions

$$f(x) = x^2 + 1, \quad g(x) = |x|, \quad h(x) = \sqrt{x^2 - 1}.$$

- (b) For each function you have sketched, choose a maximal part of the domain where the function is one-to-one (*by maximal we mean that if we add another point, the function wouldn't be 1-1*). Specify this part of the domain, then sketch the inverse function with respect to that domain.
- (c) Find the equation of the inverse for each function.
6. Suppose you are offered a job that lasts one month. Which of the following methods of payment do you prefer? Explain your answer.
- Seven million dollars at the end of the month.
  - One cent on the first day of the month, two cents on the second day, four cents on the third day, and, in general,  $2^{n-1}$  cents on the  $n$ th day. (This month has 30 days).