

I have posted a solution for number 1. Please complete number 2. This homework set is worth 5 points, toward your homework grade.

Recall:

- If  $f(x)$  is increasing at the point  $x_0$  then  $f'(x_0) \geq 0$ .
- If  $f(x)$  is decreasing at the point  $x_0$  then  $f'(x_0) \leq 0$ .

In this homework set, you will use the above criterion to analyze the sign of  $f''(x)$ .

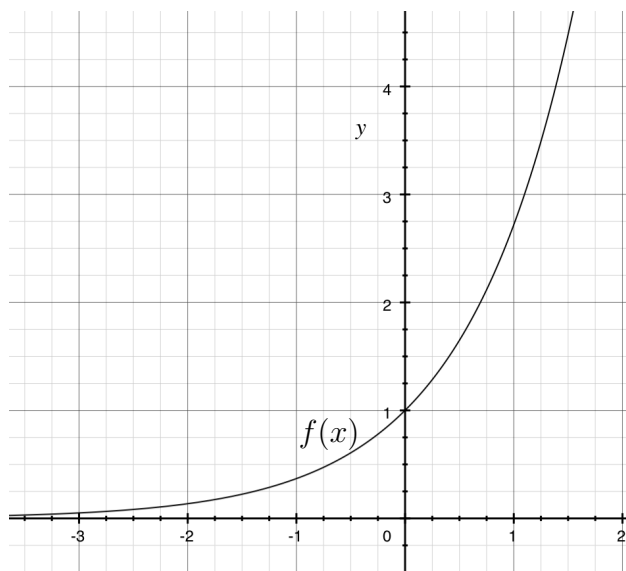


Figure 1: Use the above graph to complete Problem 1.

1. For the following problems consider the graph of  $f(x)$  shown above in Figure 1.
  - (a) Reading the graph from left to right, we see that  $f(x)$  is increasing at each point. What does this tell you about the sign of the derivative of  $f(x)$  at each point?
  - (b) Draw in the tangent line at the points  $x = -2$ ,  $x = -1$ ,  $x = 0$ , and  $x = 1$ .
  - (c) Using your picture from the previous part, explain how the slope of the tangent line is changing as we read the graph from left to right. Specifically, does the slope become steeper (more positive) or flatter (less positive)?
  - (d) Using your answer to the previous part, determine whether  $f'(x)$  is increasing or decreasing?
  - (e) For each point on the graph, is  $f''(x)$  positive or negative? [*Hint: If  $f'(x)$  is increasing, then its derivative should be...*]

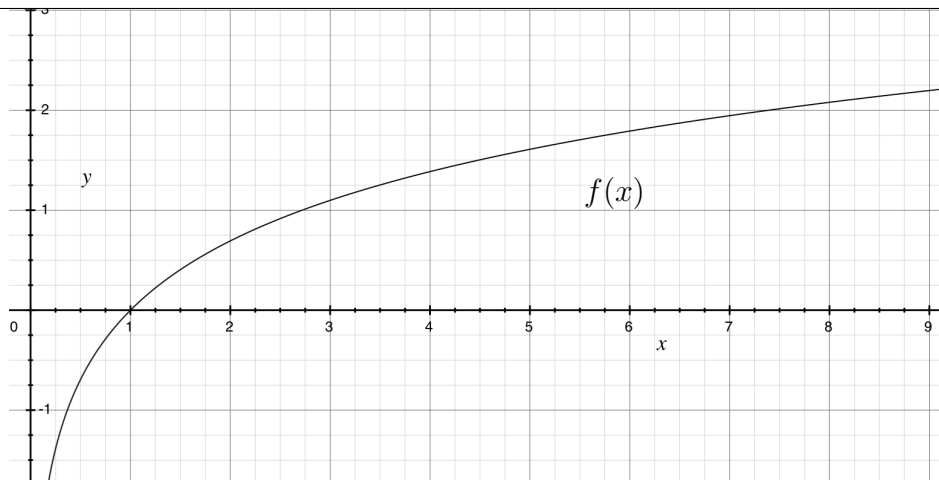


Figure 2: Use the above graph to complete Problem 2.

2. For the following problems consider the graph of  $f(x)$  shown above in Figure 2.
- Reading the graph from left to right, we see that  $f(x)$  is increasing at each point. What does this tell you about the sign of the derivative of  $f(x)$  at each point?
  - Draw in the tangent line at the points  $x = 0.5$ ,  $x = 2$ ,  $x = 4$ , and  $x = 9$ .
  - Using your picture from the previous part, explain how the slope of the tangent line is changing as we read the graph from left to right. Specifically, does the slope become steeper (more positive) or flatter (less positive)?
  - Using your answer to the previous part, determine whether  $f'(x)$  is increasing or decreasing?
  - For each point on the graph, is  $f''(x)$  positive or negative?