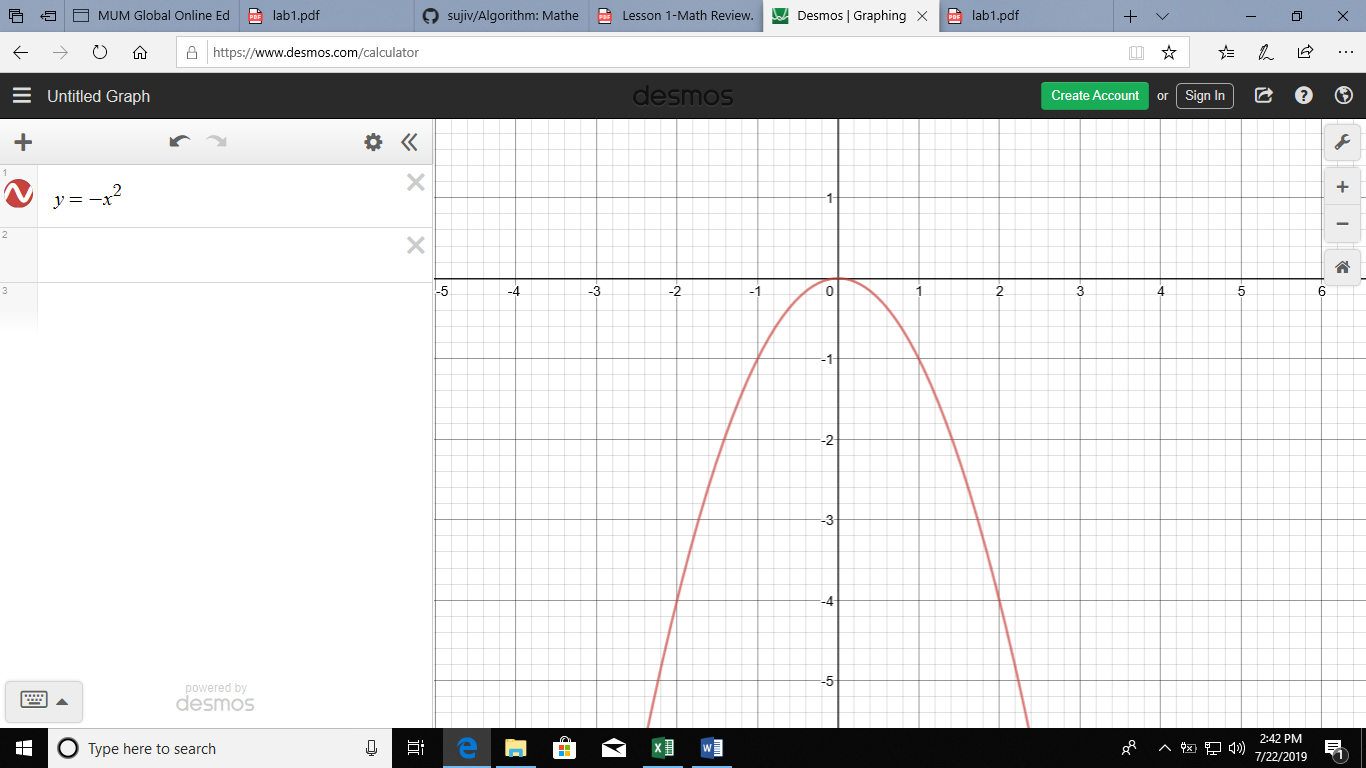
**Problem 1**. Which of the following functions are increasing? eventually nondecreasing? If you

remember techniques from calculus, you can make use of those.

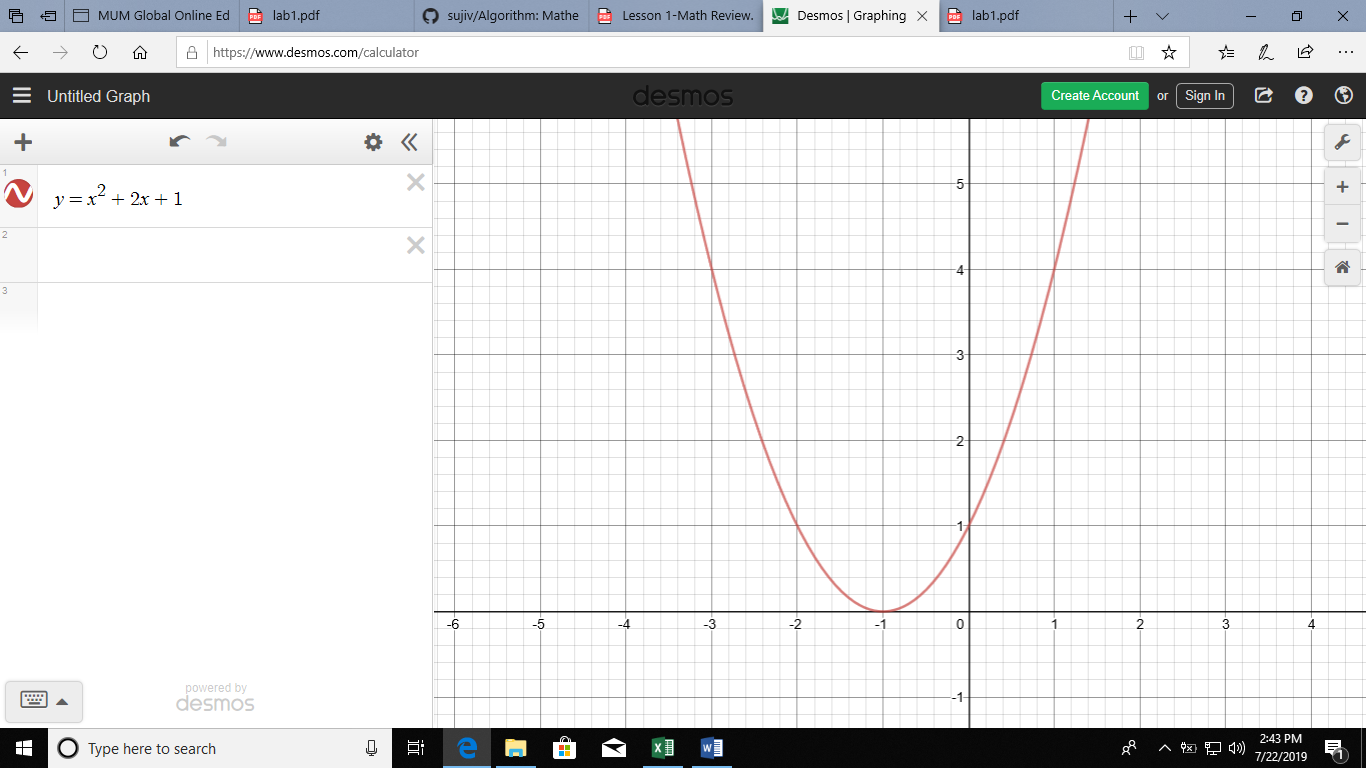
a. f(x) = -x2

Answer: The function is increasing for the range -∞<x<0 and decreasing for the range 0<x<∞

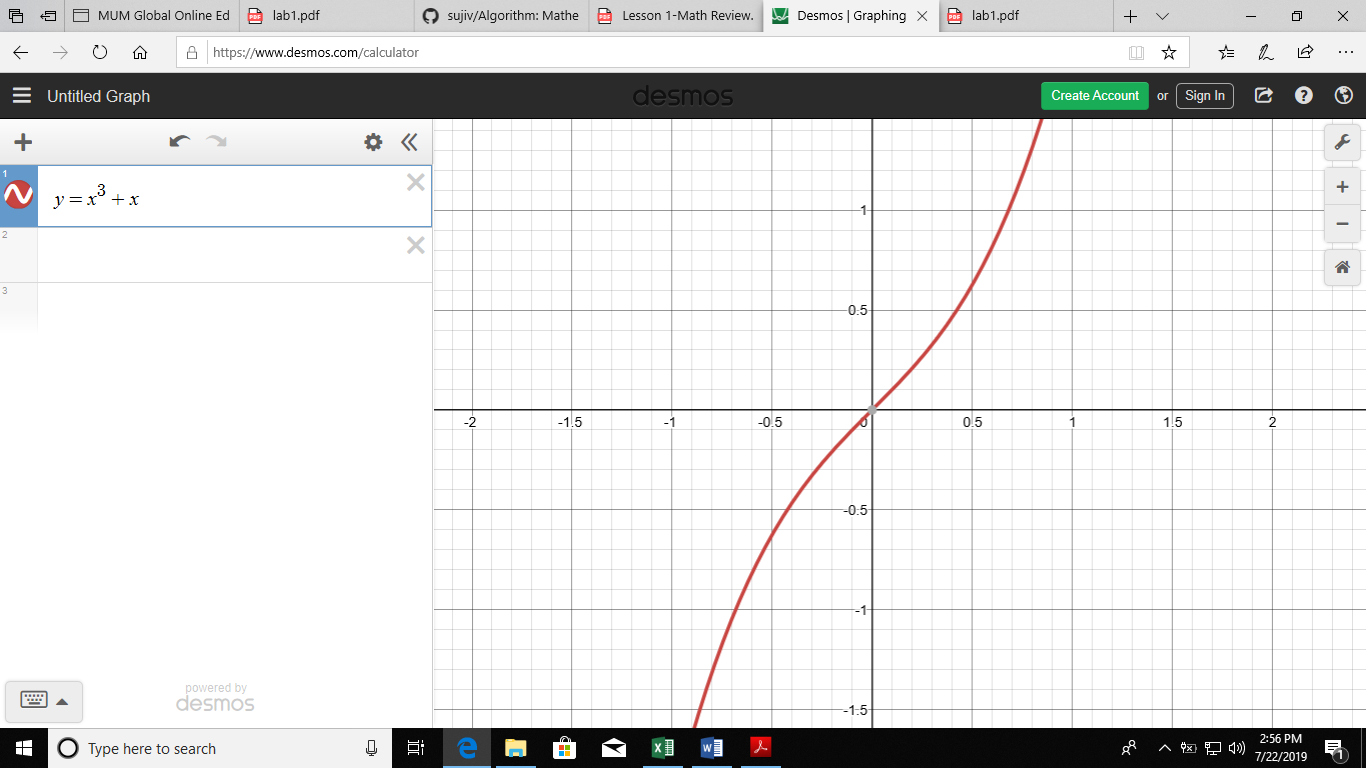


b. f(x) = x2+ 2x + 1

Answer: The function is increasing from the points x=-1 and onwards.



c. f(x) = x3+ xAnswer: The function is increasing because the function gives higher value for all higher values of x.



**Problem 2**. Use the limit definitions of complexity classes given in class to decide whether each of the following is true or false, and in each case, prove your answer.

1.  is 
2.  is 
3.  is 
4.  is 