

# Precalc – Warm Up – 2/14/11

Name: \_\_\_\_\_ Period: \_\_\_\_\_

1) Find the instantaneous rate of change of the function  $f(x) = x^3$  at  $x=2$

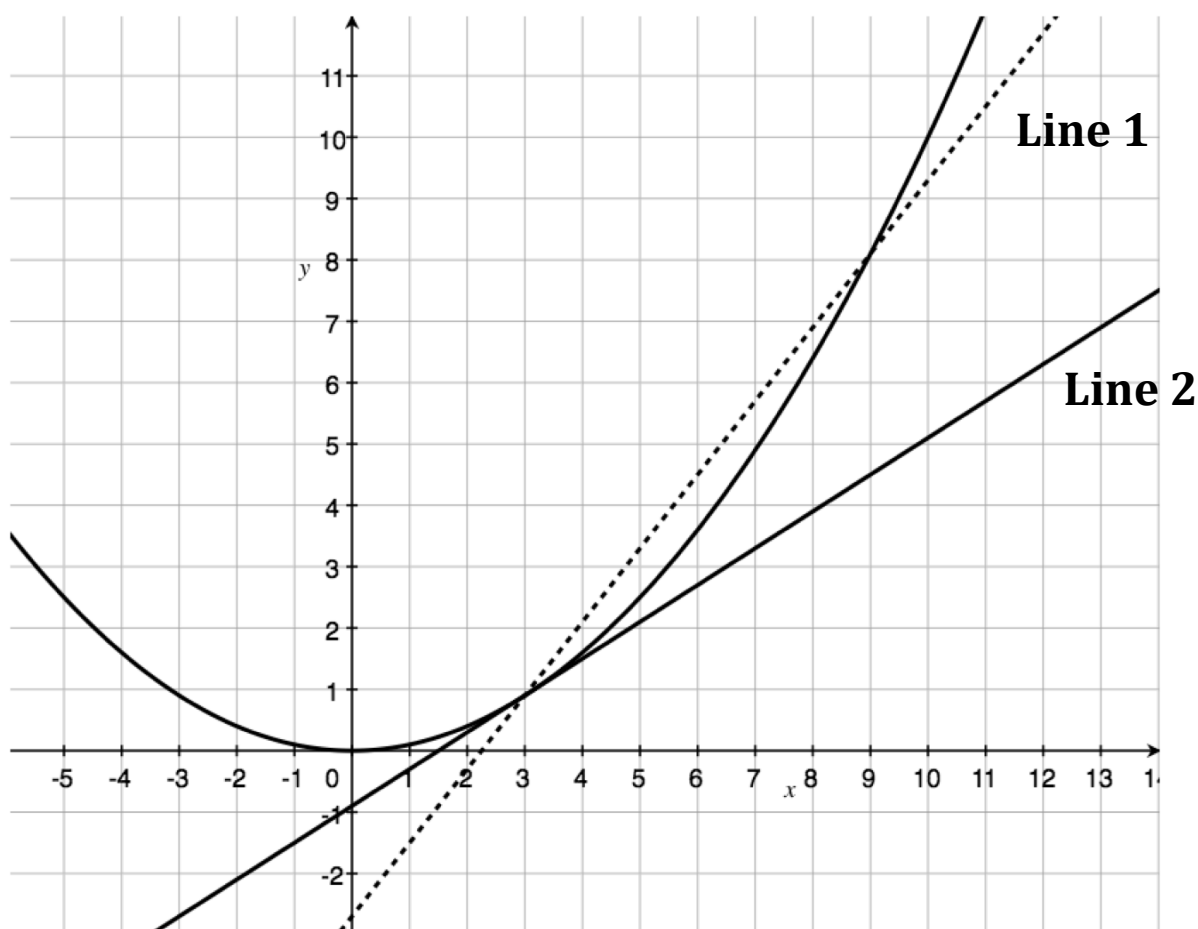
2) Find the instantaneous rate of change of the function  $f(x) = x^3$  at  $x=3$

# Precalc – Maxima, Minima, Secants and Tangents, Oh My! – 2/14/11

Name: \_\_\_\_\_ Period: \_\_\_\_\_

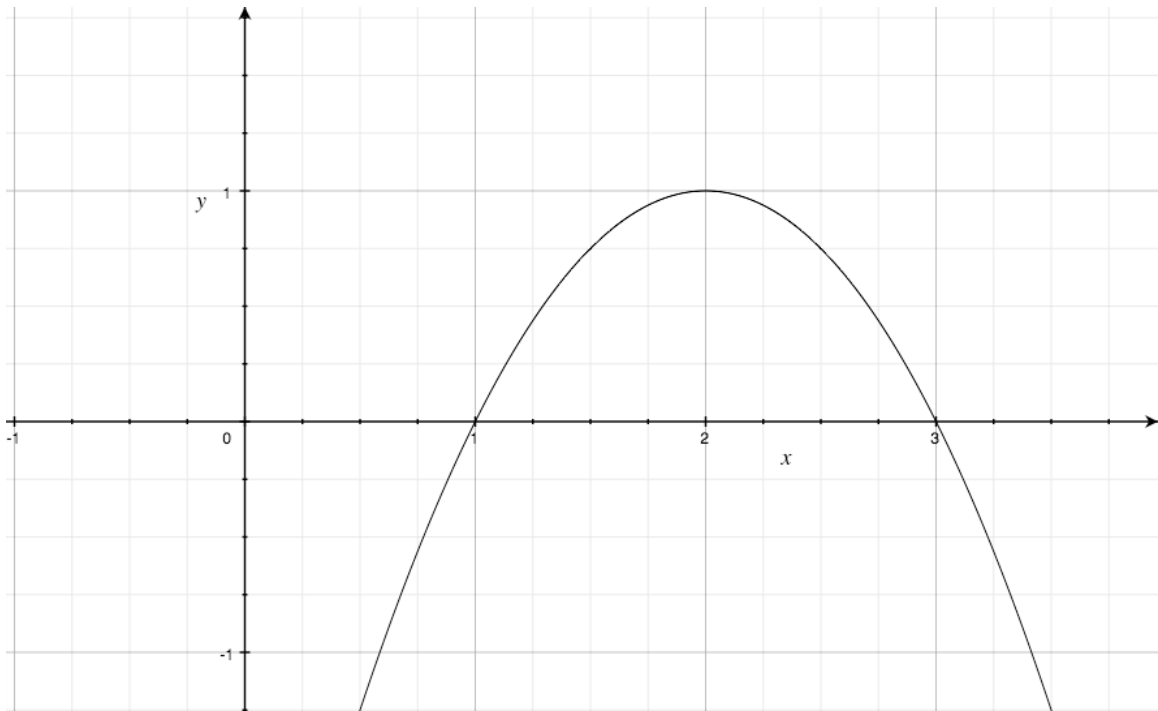
Students will be able to identify maxima and minima given the graph of a function

- 1) Consider the function  $f(x) = 0.1x^2$  and its graph below. Which line represents a better estimate of  $f(x)$ 's instantaneous rate of change at  $x=3$ , line 1 (the dashed line) or line 2 (the solid line)?

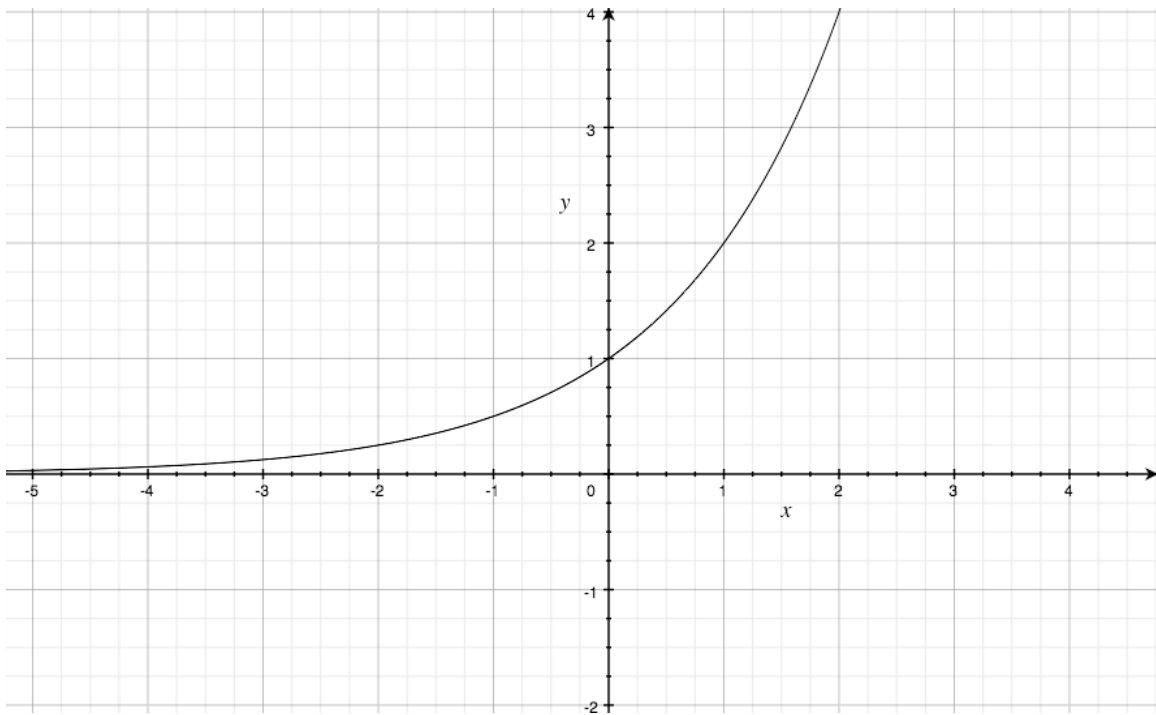


## Notes on Secant Lines vs. Tangent lines

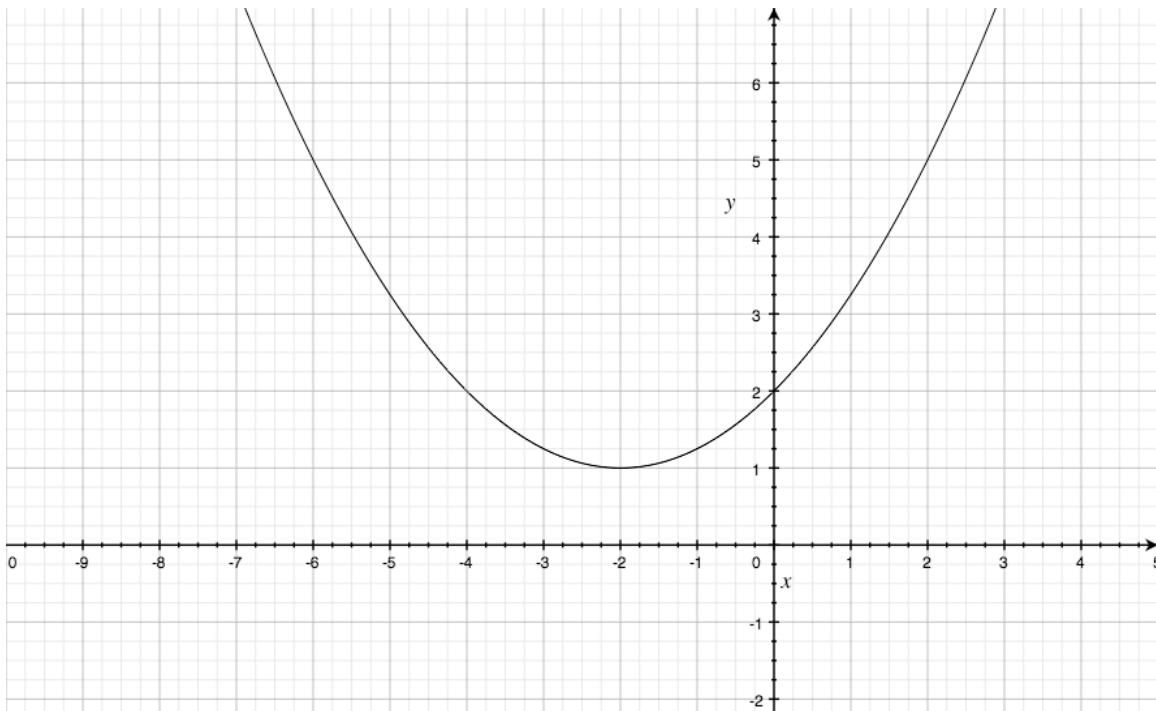
1) Sketch tangent lines to the function at  $x=2$  and  $x=3$



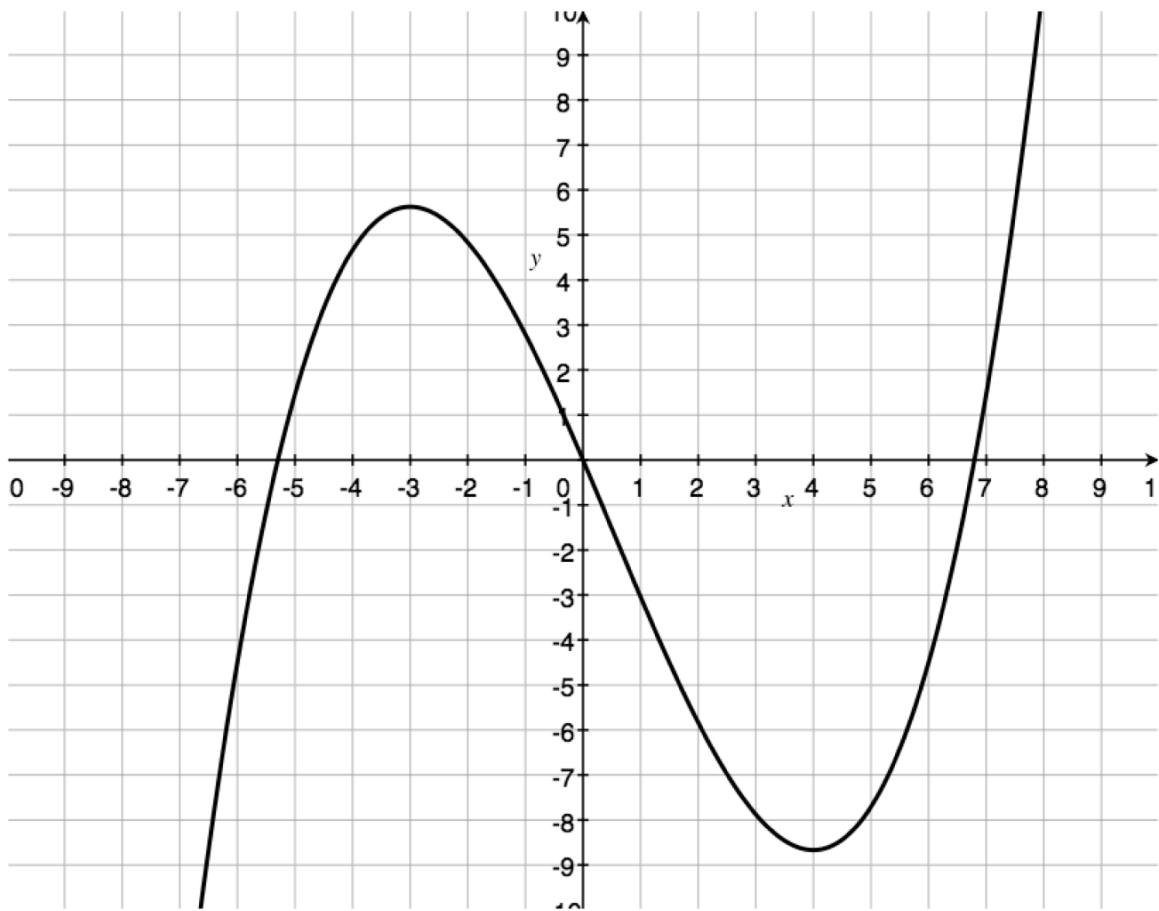
2) Sketch a tangent line to the function at  $x=0$



3) Sketch tangent lines to the function at  $x=-4$  and  $x=-1$

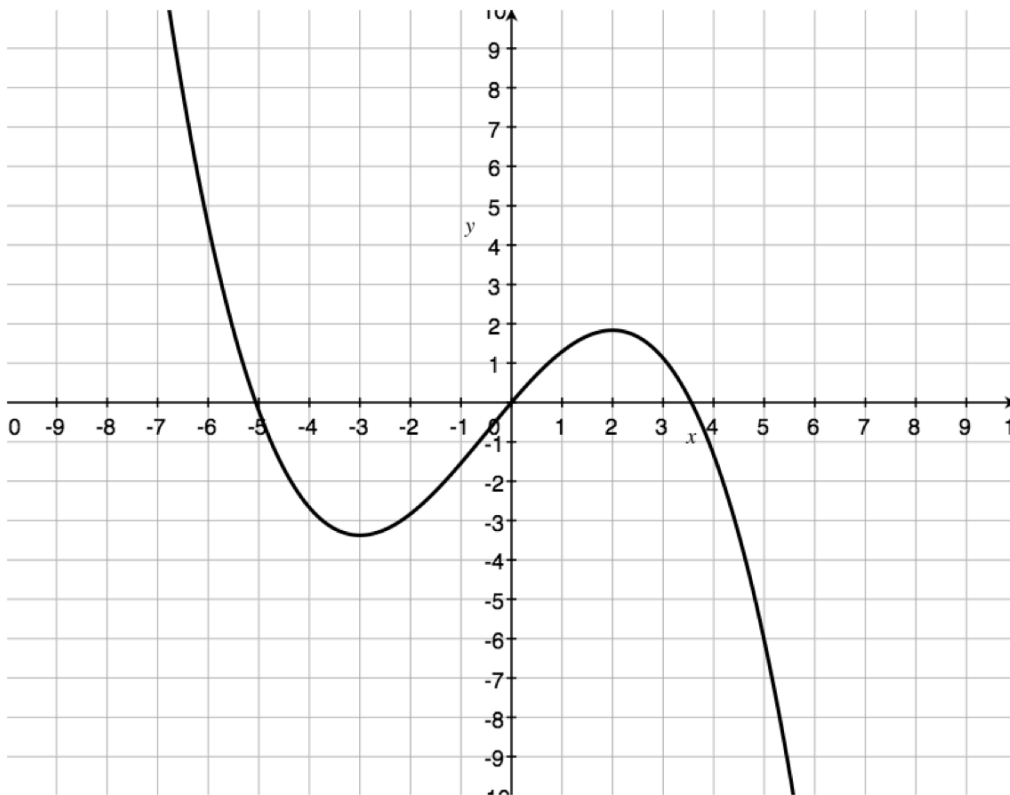


## Local Maxima, local minima and their connection to tangent lines



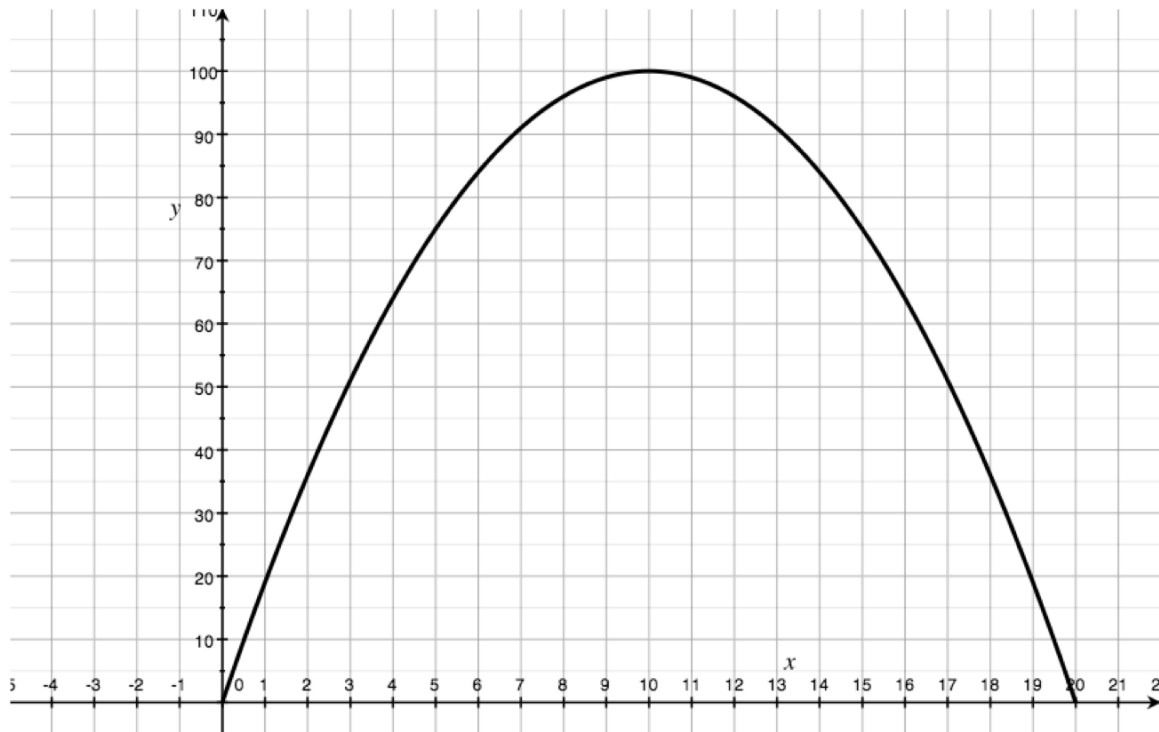
Identify x-values where you think the graph above has a maximum and a minimum. Sketch tangent lines at the maximum and minimum.

Identify the  $x$ -values where the function has maxima and minima and where the instantaneous rate of change is positive and where it is negative.



### Application of Maxima and Minima

You are filling up a bathtub with water and then let the water drain out. The number of gallons in the tub is graphed on the y-axis and time (in minutes) is graphed on the x-axis. The function that represents the number of gallons in the tub is  $f(x) = -x^2 + 20x$



- How many gallons of water are in the tub at  $x=1$ ?
- When is the tub empty?
- What is the instantaneous rate of change of water in the tub at  $x=6$ ? Is amount of water in the tub increasing or decreasing?

d) What is the instantaneous rate of change of water in the tub at  $x=16$ ?  
Is water flowing into or out of the tub?

e) What is the instantaneous rate of change of water in the tub at  $x=10$ ?  
Is water flowing into or out of the tub?

f) Using the graph, when does the tub have the maximum amount of water in it? How much water is in the tub at the maximum?

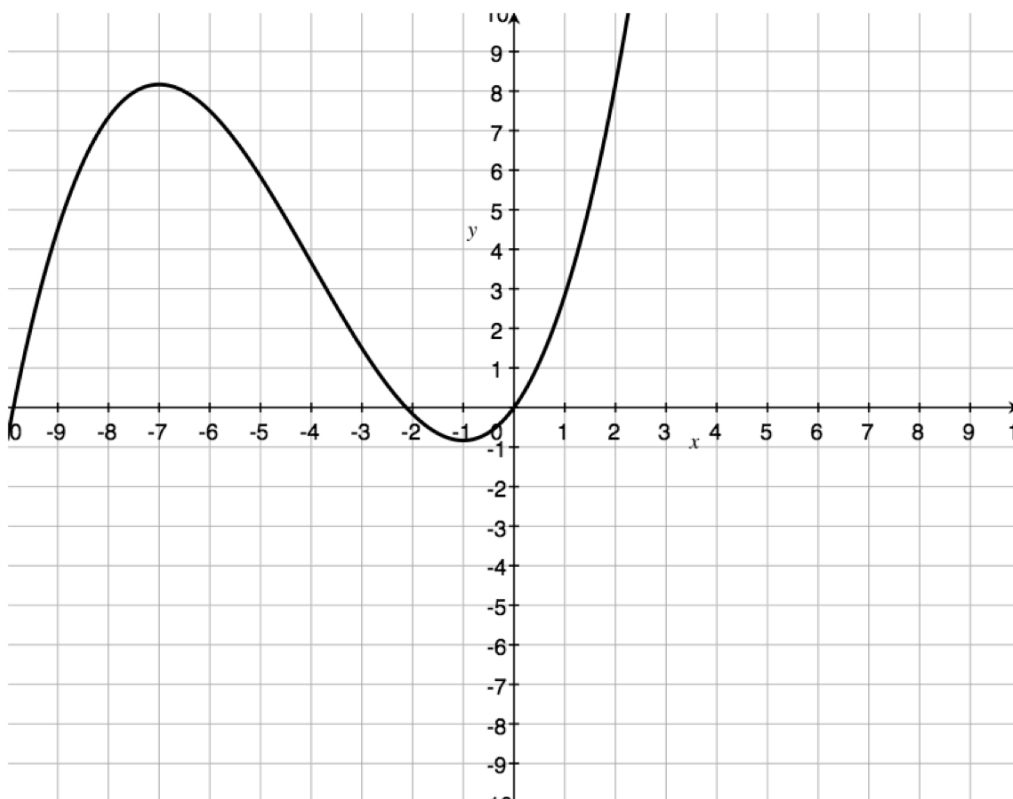


# Precalc – Exit Slip – 2/14/11

Name: \_\_\_\_\_

Period: \_\_\_\_\_

Consider the following graph of  $f(x)$ . Use it to answer the questions below.



1) Identify the x-values where  $f(x)$  has maxima and minima.

2) Sketch tangent lines to the function at  $x=1$  and  $x=-7$ .