

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

TA: \_\_\_\_\_ Sec. No: \_\_\_\_\_ Sec. Time: \_\_\_\_\_

**Math 10A.**

**Midterm Exam 2**

**November 17, 2009**

*Turn off and put away your cell phone.*

*You may use one page of notes, but no books or other assistance during this exam.*

*You may leave answers in symbolic form, for example  $\sqrt{42}$  or  $\ln(6)$ .*

*Read each question carefully, and answer each question completely.*

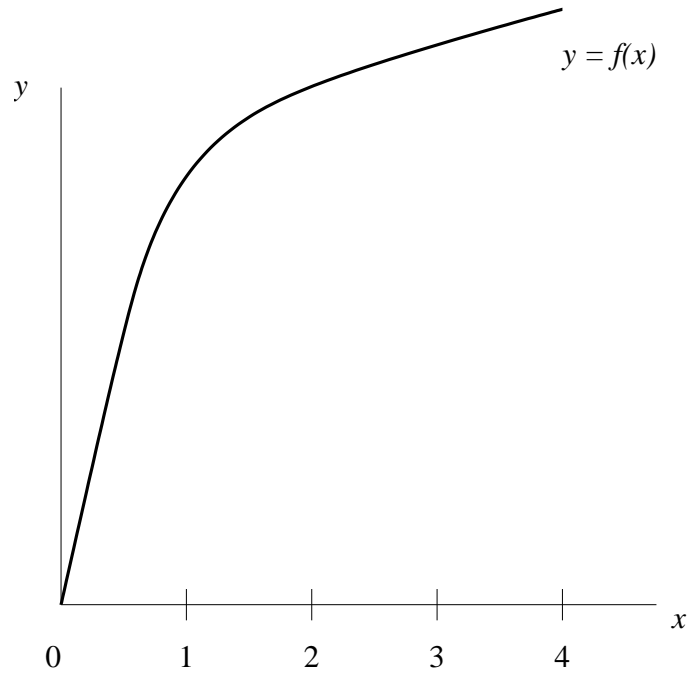
*Show all of your work; no credit will be given for unsupported answers.*

*Write your solutions clearly and legibly; no credit will be given for illegible solutions.*

*If any question is not clear, ask for clarification.*

#	Points	Score
1	4	
2	4	
3	4	
4	6	
5	6	
$\Sigma$	24	

1. (4 points) Use the graph of  $f$  below to determine which is larger in each of the following pairs:



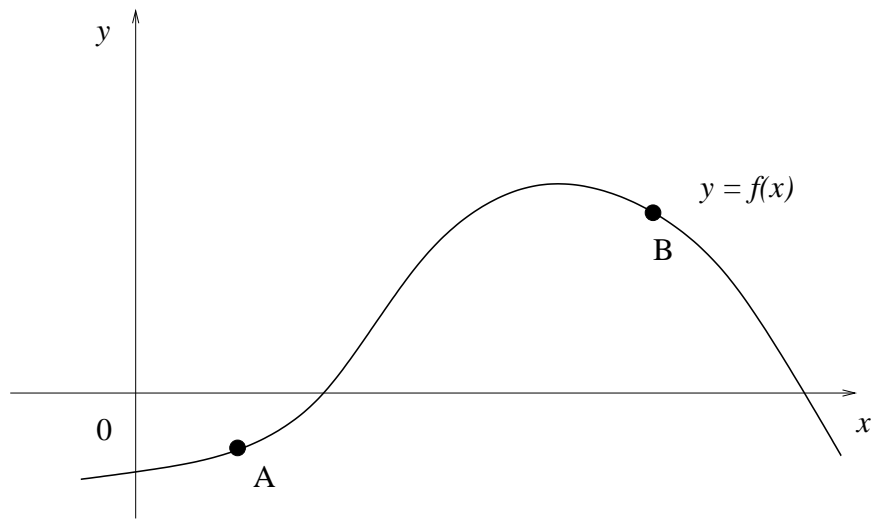
(a)  $f(1)$  or  $f(3)$ ?

(b) the average rate of change of  $f$  between  $x = 0$  and  $x = 2$  or between  $x = 1$  and  $x = 3$ ?

(c)  $f'(1)$  or  $f'(2)$ ?

(d)  $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$  or  $\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$ ?

2. (4 points) Use the graph of  $f$  below to complete the following table with the signs of  $f'$  and  $f''$  at the points  $A$  and  $B$ . In each of the empty squares, write either  $> 0$ ,  $< 0$ , or  $= 0$ .



	$f$	$f'$	$f''$
$A$	$< 0$		
$B$	$> 0$		

3. (4 points) Suppose that  $f$  is a function with  $f(5) = 2$ ,  $f'(5) = -7$  and  $f''(5) = 9$ .

(a) Find an equation for the tangent line to the graph of  $f$  at the point  $(5, 2)$ .

(b) Is the graph of  $f$  concave up or concave down at the point  $(5, 2)$ ? Briefly justify your answer.

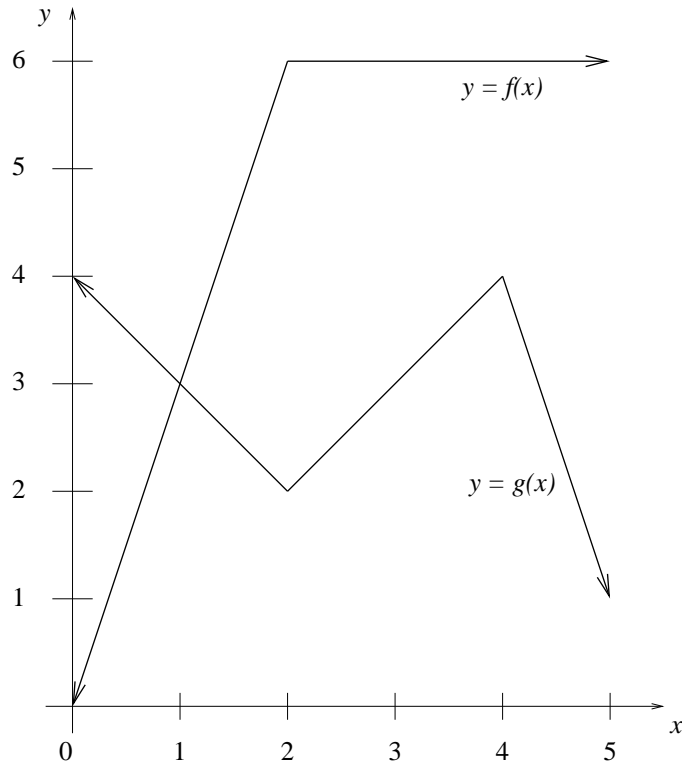
4. (6 points) Find the derivative of the given function. Assume that  $a$  is a fixed constant.

(a)  $f(x) = 4 \sin(x) - 9\sqrt{x}$

(b)  $g(x) = a^x \cdot \cos(2x + 1)$

(c)  $h(x) = \frac{x^7 - ax^3}{e^x + 1}$

5. (6 points) Consider the functions  $f$  and  $g$  whose graphs are given below.



(a) If  $h(x) = f(x) \cdot g(x)$ , what is  $h'(1)$ ? Please show your work.

(b) If  $m(x) = f(g(x))$ , what is  $m'(3)$ ? Please show your work.

(c) List all values of  $x$  at which  $g$  is not differentiable.