Math 103 Exam # 3 Fall 2013

Name _____(PRINT)

Recitation (circle one):	Tue 8:30	Tue 9:30	Th 8:30	Th 9:30
George →	201	202	203	204
Jack →	205	206	207	208

This exam has 4 multiple choice questions, 1 open-ended question, and 2 multiple part open-ended questions. Each question is worth 10 points for a total of 70 points (the multi part questions have 2 parts with each worth 5 points). Partial credit will be given for the entire exam so be sure to show all work. On the multiple choice questions, circle the correct answer and give supporting work, a correct answer with little or no supporting work will receive little or no credit. Use the space provided to show all work. A sheet of scrap paper is provided at the end of the exam. If you write on the back of any page please indicate this in some way.

You have **50 minutes** to complete the exam. You are not allowed the use of a calculator or any other electronic device. You are allowed to use the front and back of a standard 8.5"X11" sheet of paper for handwritten notes. Please silence and put away all cell phones and other electronic devices. When you finish, please stay seated until the entire 50 minutes has elapsed. When time is up continue to stay seated until someone comes by to collect your exam.

Do **NOT** write in the grid below. It is for grading purposes only.

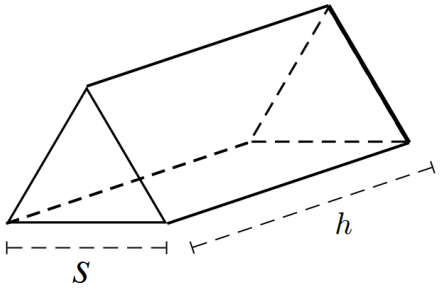
Problem	Points
1	
2	
3	
4	
5	
6	
7	
Total	

1. Evaluate the limit

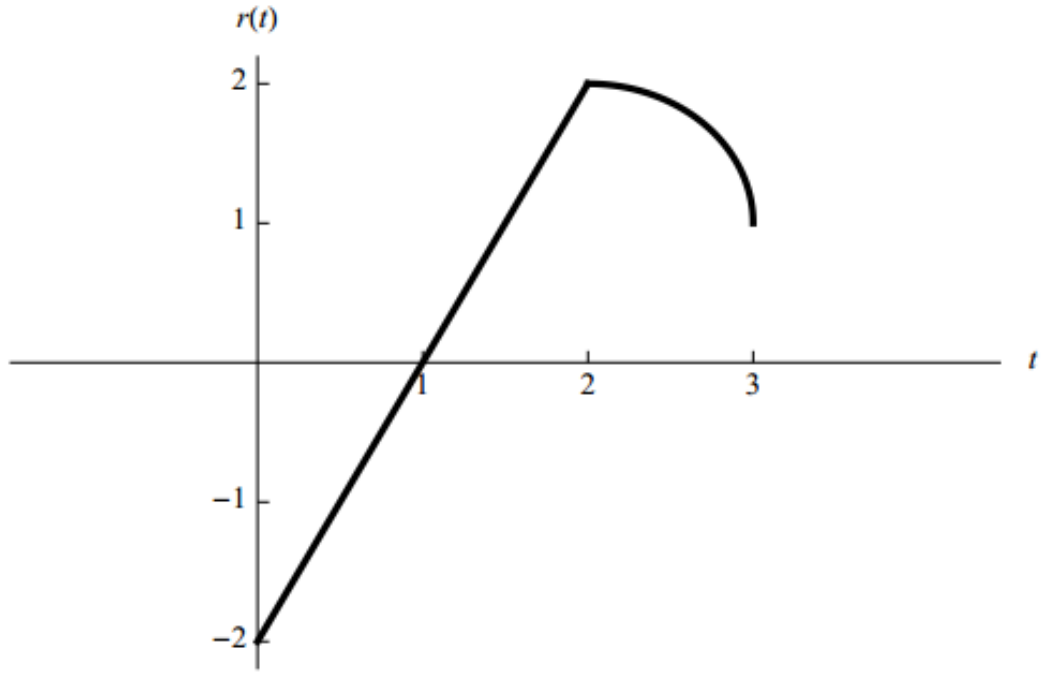
$$\lim_{x\to 0}\frac{\arcsin(x)-x}{\arctan(x)-x}$$

A) $\frac{1}{3}$
B) $\frac{1}{2}$
C) 0
D) 1
E) $\frac{-1}{2}$
F) $\frac{-1}{3}$
G) does not exist
H) ∞

2. The volume of a prism is the area of the base times the height. The base of the prism below is an equilateral triangle. The area of an equilateral triangle of side length s is $\frac{\sqrt{3}}{4}s^2$. If the prism has a fixed volume of 16, find the values of s and h that will minimize surface area.



3. Shown below is a graph of a function $r(t)$. The graph consists of a straight line between $t = 0$ and $t = 2$ and a quarter circle between $t = 2$ and $t = 3$.



Calculate the following using the graph and the properties of integrals.

a. $$-3\int_0^3 (2 + r(t))dt.$$

b. $$\int_{1/2}^{3/2} r'(t)dt.$$

4. Let

$$G(x) = \int_0^{\cos x} \frac{1}{1-t^2}\,dt$$

Find the derivative of $G(x)$ evaluated at $\frac{\pi}{6}$. .

A) -2 B) -1 C) $\frac{-1}{2}$ D) 0

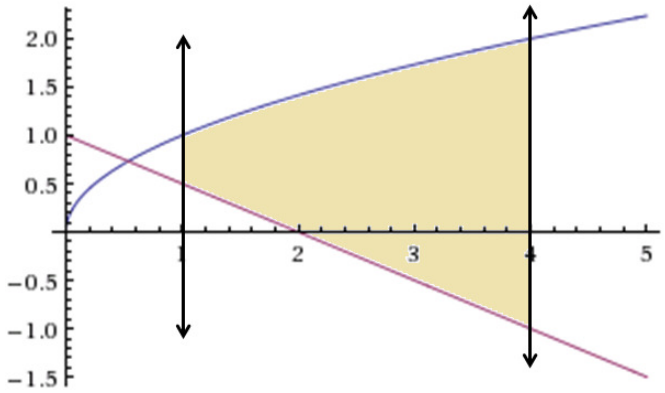
E) $\frac{1}{4}$ F) 1 G) $\frac{2}{3}$ H) 2

5. Evaluate

$$\int_{e}^{e^8} \frac{1}{x \cdot \sqrt[3]{\ln x}}\, dx$$

A) 1
B) $\frac{45}{4}$
C) $\frac{7}{3}$
D) $\frac{9}{2}$
E) 0
F) $\frac{33}{4}$
G) $\frac{41}{3}$
H) 5

6. Find the area of the region bounded by $y=\sqrt{x},\ y=\frac{-1}{2}x+1,\ x=1,$ and $x=4$. See the graph below.



A) 5
B) $\frac{41}{8}$
C) $\frac{21}{4}$
D) 2
E) 3
F) $\frac{65}{12}$
G) $\frac{25}{6}$
H) 4

7a. Let $\sinh(x)=\frac{5}{12}$. Use the identity $\cosh^2(x)-\sinh^2(x)=1$ to find $\cosh(x)$.

7b. (unrelated to part a) Simplify $\sinh(\ln 4)$

Scrap Paper

If you use this page and intend for me to look at it, then you must indicate so on the page with the original problem on it. Make sure you label your work with the corresponding problem number.

Do **NOT** rip this page off.