Math 103
Exam # 1
Fall 2013

Name _____(PRINT)

Recitation (circle one):

Tue 8:30	Tue 9:30	Th 8:30	Th 9:30
201	202	203	204
205	206	207	208

This exam has 5 multiple choice questions, 1 open-ended question and 1 true/false question. Each question is worth 10 points for a total of 70 points. Some questions have two parts, in those cases each part is 5 points. Partial credit will be given for the entire exam so be sure to show all work. On the multiple choice, 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 following limits:

I) $$\lim_{x\to 0}\frac{\frac{1}{x-4}+\frac{1}{4}}{x}$$

A) -1/16
B) -1/8
C) -1/4
D) -1/2
E) 1/2
F) 1/4
G) 1/8
H) 1/16

II) $$\lim_{x\to -\infty}\frac{-x+4x^2-6x^6}{x^3-3x^2}$$

A) -6
B) 2
C) -1
D) 1
E) 0
F) $-\infty$
G) ∞
H) does not exist

2. Decide whether the statement is true or false**. If it is true explain why. If it is false explain why.**

I)

There is at least one root of the function

$f(x) = x^4 - 2x^3 - \sqrt{x-1}$ on the interval $(2,5)$

II) $\lim_{x \to 0} \frac{\sin(9x)}{\sin(3x)} = 3$

3. Part I:

Find the values of *a* and *b* so that the function

$$f(x)=\begin{cases}\frac{1}{x} & x<-1\\ ax+b & -1\le x\le \frac{1}{2}\\ \frac{1}{x} & x>\frac{1}{2}\end{cases}$$

is continuous on $(-\infty,\infty)$.

4 points

a =

A) 0 E) 4
B) 1 F) 5
C) 2 G) 6
D) 3 H) 7

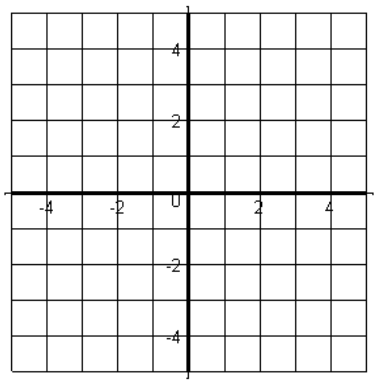
4 points

b =

A) 0 E) 4
B) 1 F) 5
C) 2 G) 6
D) 3 H) 7

3 points

Part II: Graph $f(x)$.



4. Let $f(x) = x\sqrt{5-x^2}$. Find the equation of the normal line at $x = 1$.

A) $y = \frac{-3}{5}x + \frac{13}{5}$

B) $y = \frac{-2}{5}x + \frac{12}{5}$

C) $y = \frac{5}{2}x - \frac{1}{2}$

D) $y = \frac{-2}{3}x + \frac{8}{3}$

E) $y = \frac{3}{2}x + \frac{1}{2}$

F) $y = \frac{1}{2}x + \frac{3}{2}$

G) $y = -2x + 4$

H) None of these

5. Let $f(x) = \tan^3(2x)$. Find $f'\left(\frac{\pi}{12}\right)$.

A) $\frac{\sqrt{3}}{2}$

B) $\frac{2}{9}$

C) $\frac{1}{2}$

D) 24

E) $\frac{2}{3}$

F) $\frac{4}{3}$

G) $\frac{8}{3}$

H) None of these

6. Find the slope of the tangent line to the curve

$$x^2y - y^2x = x^2 + 3$$

at the point $(-3,1)$.

A) 0

B) $\frac{1}{15}$

C) $\frac{-2}{3}$

D) $\frac{2}{3}$

E) $\frac{1}{3}$

F) $\frac{-1}{3}$

G) $\frac{6}{7}$

H) $\frac{1}{6}$

7. Let

$$f\left(x\right)=2\sqrt{x}$$

Find $f'(x)$ **by using the limit definition of the derivative**.

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.