

Math 103 Exam # 2

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 5 multiple choice questions, 1 open-ended question, and 1 multiple part true/false question. Each question is worth 10 points for a total of 70 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. Let

$$f(x) = (\tan x)^{x^2}$$

Find $f'\left(\frac{\pi}{4}\right)$

A) 0

B) $\ln 2$

C) 1

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

E) $\frac{\pi^2}{4}$

F) $\frac{\sqrt{2}\pi^2}{16}$

G) $\frac{\pi^2}{8}$

H) $\frac{\pi^2}{16}$

2. Let

$$f(x) = \arctan(\sqrt{3x+2})$$

Find $f'\left(\frac{-7}{12}\right)$

- A) $\frac{12}{5}$ B) $\frac{4}{5}$ C) $\frac{1}{2}$ D) $\frac{1}{4}$
E) $\frac{3}{4}$ F) $\sqrt{2}$ G) $\frac{\sqrt{2}}{2}$ H) $\frac{\sqrt{2}}{4}$

3. A right circular cylinder has its height 3 times as long as its radius. What is the rate of change of the radius in inches per second, when the volume is increasing at the rate of

$28\pi \frac{\text{in.}^3}{\text{sec.}}$ and the radius is $\frac{2}{3}$ inches?

- A) $10 \frac{\text{in.}}{\text{sec.}}$ B) $9 \frac{\text{in.}}{\text{sec.}}$ C) $8 \frac{\text{in.}}{\text{sec.}}$ D) $7 \frac{\text{in.}}{\text{sec.}}$
E) $6 \frac{\text{in.}}{\text{sec.}}$ F) $5 \frac{\text{in.}}{\text{sec.}}$ G) $4 \frac{\text{in.}}{\text{sec.}}$ H) none of these

4. Let

$$f(x) = xe^{-\frac{x}{2}}$$

Find the absolute maximum value of f on the interval $[0,6]$

A) 0

B) 1

C) 2

D) e

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

F) $\frac{2}{e}$

G) $\frac{4}{e^2}$

H) $\frac{6}{e^3}$

5. Suppose a car that is equipped with an E-Z Pass drives from the toll plaza in Carlisle, PA (mile marker 226 on the PA Turnpike) to the one in Valley Forge (marker 326) in 1 hour and 15 minutes. A few days later the driver receives a speeding ticket in the mail. How did the PA state troopers know that the driver was speeding?

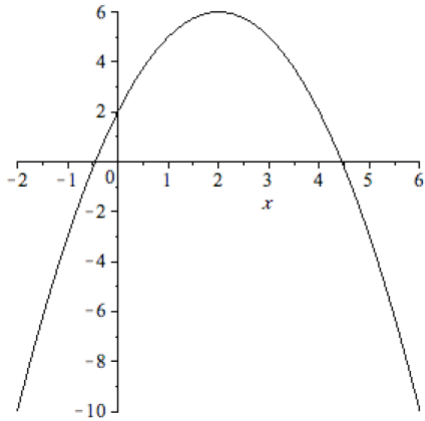
6. Find the local maximum value of

$$f(x) = x\sqrt{8-x^2}$$

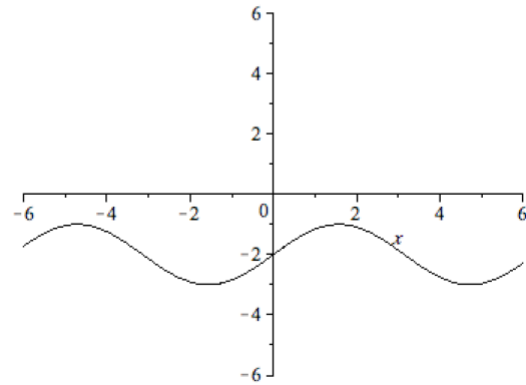
- A) -4 B) -2 C) 0 D) 2
E) $2\sqrt{2}$ F) 4 G) 6 H) 8

7. There are two functions f and g . The graphs of their **derivatives** are given below. For each given statement: Write **TRUE** if the statement must be true. Write **FALSE** if the statement must be false. Write **NED** if there is not enough information to decide. (e.g. if the statement might be true and might be false).

$g'(x)$



$f'(x)$



EXPLAIN

(i) $g''(x)$ is a decreasing function

(ii) $f(x)$ is a decreasing function

(iii) $f(x)$ has an inflection point

(iv) $g(x)$ has no local minima

(v) $f(x)$ is never zero

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.