

Math 1271 Calculus I  
Spring 2015  
Exam 1A  
2/19/15  
Time Limit: 50 Minutes

Name (Print): \_\_\_\_\_

Workshop Leader: \_\_\_\_\_

Section #: \_\_\_\_\_

This exam contains 8 pages (including this cover page) and 8 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and **put your initials** on the top of every page, in case the pages become separated.

You may *not* use your books, notes, or a graphing calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

- **Organize your work** in a reasonable, tidy, and coherent way. Work that is disorganized and jumbled that lacks clear reasoning will receive little or no credit.
- **Unsupported answers will not receive full credit.** An answer must be supported by calculations, explanation, and/or algebraic work to receive full credit. Partial credit may be given to well-argued incorrect answers as well.
- If you need more space, use the back of the pages. **Clearly indicate when you have done this.**
- **Give answers in exact form** ( $\sqrt{2}$  not 1.414,  $\pi$  not 3.14159)

| Problem | Points | Score |
|---------|--------|-------|
| 1-2     | 14     |       |
| 3       | 10     |       |
| 4       | 10     |       |
| 5       | 15     |       |
| 6       | 24     |       |
| 7       | 15     |       |
| 8       | 12     |       |
| Total:  | 100    |       |

Do not write in the table to the right.

1. (7 points) Find the derivative of  $y = \sqrt{x} e^{-3x^2+2}$ .

(a)  $\frac{(1 + 12x)}{2\sqrt{x}} e^{-3x^2+2}$

(b)  $\frac{(1 + 12x^2)}{2\sqrt{x}} e^{-3x^2+2}$

(c)  $\frac{(1 - 12x)}{2\sqrt{x}} e^{-3x^2+2}$

(d)  $\frac{(1 - 12x^2)}{2\sqrt{x}} e^{-3x^2+2}$

(e) None of the Above.

#1 ANSWER\_\_\_\_\_

2. (7 points) Find the derivative of  $\frac{\theta}{1 - \tan \theta}$ .

(a)  $\frac{1}{\sec^2 \theta}$

(b)  $\frac{1 + \tan \theta + \theta \sec^2 \theta}{(1 - \tan \theta)^2}$

(c)  $\frac{1 - \tan \theta + \theta \sec^2 \theta}{(1 - \tan \theta)^2}$

(d)  $\frac{1 - \tan \theta - \theta \sec^2 \theta}{(1 - \tan \theta)^2}$

(e) None of the Above.

#2 ANSWER\_\_\_\_\_

3. (10 points) Compute the limit

$$\lim_{y \rightarrow 0} \frac{\cos^4(x+y) - \cos^4 x}{y}.$$

4. (10 points) Suppose that the function  $f(x)$  has  $f'(x) = \sin^2(x + 3)$ .

Let  $g(x) = f(x^3)$ . What is  $g'(x)$ ?

5. (15 points) Find an equation of the tangent line that is tangent to the curve  $y = 3x^2 - 4x$  and parallel to the line  $8x - y + 5 = 0$ .

6. (24 points) Find the limit.

(a) (8 points)  $\lim_{x \rightarrow -\infty} \frac{3x + 2}{x^2 - 1}$

(b) (8 points)  $\lim_{x \rightarrow 3^-} \frac{x^2 - 9}{|x - 3|}$

(c) (8 points)  $\lim_{x \rightarrow 4} \frac{x - 4}{\sqrt{x} - 2}$

7. (15 points) Let

$$f(x) = \begin{cases} 2x, & \text{if } x < 1 \\ x^2 + ax, & \text{if } x \geq 1. \end{cases}$$

(a) (7 points) Show that  $f$  is not continuous at  $x = 1$  when  $a = 3$ .

(b) (8 points) For what value of  $a$  is  $f(x)$  is continuous at every  $x$ ?

8. (12 points) Show that  $x^3 - x - 1 = 0$  has a root in the interval  $(-1, 2)$ .