Math 2A **Name (Print):** _____
Fall 2016
Quiz 6
11/03/2016
Time Limit: 15 Minutes Student ID _____

This exam contains 3 pages (including this cover page) and 2 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 any calculator on this exam.

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

- **If you use a "theorem" you must indicate this** and explain why the theorem may be applied.
- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, use the back of the pages; clearly indicate when you have done this.

Do not write in the table to the right.

Problem	Points	Score
1	6	
2	4	
Total:	10	

1. Solve for y'. Simplify your answer (Remove all parenthesis) for question a and b.

   (a) (2 points)

$$xe^y = ye^x$$

   Answer:

$$y' = \frac{e^y - ye^x}{e^x - xe^y}$$

   (b) (2 points)

$$y = \ln(\tan x + \sec x)$$

   Answer:

$$y' = \sec x$$

(c) (2 points) $y = b^{g(x)}$ where $g(x)$ is a function and b is a positive number.

Answer:

$$y' = ln(b)b^{g(x)}g'(x)$$

2. (4 points) Give the equation of the tangent line of the circle $x^2 + y^2 = 9$ which is parallel to the line $y = \frac{-x}{2} + \frac{3\sqrt{5}}{2}$, and also, give the point of intersection of that tangent line and the given circle.
Hint: Two lines on xy-plane are parallel to each other if they do not intersect at any point on xy-plane.

Answer:

$$y' = -\frac{x}{y} \text{ so we want } x \text{ and } y \text{ such that } -\frac{x}{y} = -\frac{1}{2}$$

Let $y = 2x$, then we have

$$x^2 + 4x^2 = 9 \;\Rightarrow\; x^2 = \frac{9}{5} \;\Rightarrow\; x = \pm\frac{3}{\sqrt{5}}$$

Thus, we have two choices: $(x, y) = \left(\frac{3}{\sqrt{5}}, \frac{6}{\sqrt{5}}\right)$ and $(x, y) = \left(-\frac{3}{\sqrt{5}}, -\frac{6}{\sqrt{5}}\right)$, and the respective tangent lines are

$$y = \frac{-x}{2} + \frac{3\sqrt{5}}{2} \text{ and } y = \frac{-x}{2} - \frac{3\sqrt{5}}{2}$$

Since the line is not paralle to itself, the only answer is

$$y = \frac{-x}{2} - \frac{3\sqrt{5}}{2}$$

with the intersection $\left(-\frac{3}{\sqrt{5}}, -\frac{6}{\sqrt{5}}\right)$