

## Group Work 7 - Math 165

Names: \_\_\_\_\_

Turn in one copy of your work and answers with all names of group members on it. Show all work to receive credit for this exercise. You may not consult with other groups, but you may use your book and notes, and ask questions of the instructor. This exercise counts as one quiz score.

1. Find  $\frac{dy}{dx}$  if  $e^{xy+1} = 3xy - x^2$ .
2. Suppose that  $f$  is continuous and strictly increasing on  $[0, 1]$  with  $f(0) = 0$  and  $f(1) = 1$ . If  $\int_0^1 f(x)dx = \frac{3}{4}$ , what is the value of  $\int_0^1 f^{-1}(y)dy$ ? [Hint: Draw a picture.]
3. Find  $f'(1)$  if  $f(x) = x^{\sin(x)}$ .
4. Let  $a, b > 0$ . Prove that  $(ab)^x = a^x b^x$  and  $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$ .
5. Find the equation of the tangent line to the curve  $y = \log_8(x^2 + 3)$  at the point when  $x = 2$ .
6. Evaluate  $\int_0^1 (10^{3x} + 10^{-3x}) dx$ .
7. What is  $\lim_{x \rightarrow 0} \ln\left(\frac{\sin(x)}{x}\right)$ ?
8. Show that  $g(x) = \frac{x}{e^x - 1} - \ln(1 - e^{-x})$  is decreasing for  $x > 0$ .