University of Connecticut
Department of Mathematics

MATH 1131Q PRACTICE EXAM 2 SPRING 2017

NAME: _____

DISCUSSION SECTION: _____

Read This First!

- Read the questions and instructions carefully.
- The available points for each problem are given in brackets.
- You must **show your work** to obtain full credit (and to possibly receive partial credit). Correct answers with no justification will not receive credit.
- Make sure your answers are clearly indicated, and cross out any work you do not want graded.
- Do not leave any blanks! Even if you do not arrive at an answer, show as much progress towards a solution as you can, and explain your reasoning.
- Calculators are allowed, but models that can do symbolic computations (TI-89 and above, including TI-NSpire) are not allowed.

Grading - For Administrative Use Only

Page:	1	2	3	4	Total
Points:	13	9	15	13	50
Score:					

1. Find the derivative of $f'(x)$ of each of the following functions. **You do not need to simplify your answer.**

   (a) $f(x) = \dfrac{\sin x}{3e^x + 1}$ [4]

   (b) $f(x) = 5x^8 \tan x$ [4]

   (c) $f(x) = \cos\left(\ln\left(x^2\right)\right)$ [5]

2. There are 30 guinea pigs introduced into an ecosystem, and their population grows at a rate proportional to its size. In 2 years, the population grows to 85 guinea pigs.

   (a) Find a formula for the function $P(t)$ that gives the population of guinea pigs at any time t measured in years. [5]

   (b) Using your answer to part (a), determine how long it would take the guinea pig population to quadruple. [4]

3. Let $f(x) = x^x$.

   (a) Find the derivative $f'(x)$. [6]

   (b) Use your answer to part (a) to find the linearization of $f(x)$ at $x = 1$. [3]

4. Find $\dfrac{dy}{dx}$ given $7xe^{2y} + y = 10$. **You do not need to simplify your answer.** [6]

5. Ship A is traveling directly north away from a dock at 6 mi/hr. Ship B is traveling directly east away from the same dock at 9 mi/hr. Find the rate at which the distance between the two ships is changing at the moment when Ship A is 8 mi from the dock, and Ship B is 12 mi from the dock. [7]

6. Circle to indicate whether each statement is true or false, and **justify your answers**.

   (a) If $f(x)$ is a differentiable function, then $\frac{d}{dx}(f(\sqrt{x}))$ is $\frac{f'(x)}{2\sqrt{x}}$ [3]

   True **False**

   (b) If a circle is expanding and its radius is increasing at a constant rate of 2 cm/s, then its area is increasing at a constant rate. Note: the area of a circle of radius r is $A = \pi r^2$. [3]

   True **False**