Math 10A with Professor Stankova
Quiz 6; Wednesday, 10/4/2017
Section #106; Time: 10 AM
GSI name: Roy Zhao **Name:** _____

Circle True or False or leave blank. (1 point for correct answer, -1 for incorrect answer, 0 if left blank)

1. True **FALSE** Every function has a unique antiderivative.

2. **TRUE** False The derivative of an anti-derivative of a function, is the function itself.

Show your work and justify your answers. Please circle or box your final answer.

3. (10 points) You are drinking from a glass of water through a straw. After t seconds, the height of the water is decreasing at a rate of $2e^{-t} cm/s$.

   (a) (4 points) Let $h(t)$ denote the height of the water after t seconds. Write a differential equation for h (write $\frac{dh}{dt} =$ something).

   Solution: We are told that the height is decreasing at a rate of $2e^{-t}$ so the differential equation is
   $$\frac{dh}{dt} = -2e^{-t}.$$

   (b) (4 points) Initially, the $2cm$ tall glass is full. Find the equation for $h(t)$.

   Solution: The general form is $h(t) = 2e^{-t} + C$ and we are told that $h(0) = 2$ so $2 + C = 2$ so $C = 0$. Thus, we have that $h(t) = 2e^{-t}$.

   (c) (2 points) How high is the water level after 2 seconds?

   Solution: The height is $h(2) = 2e^{-2}$.