10350 Tutorial Week 04 - Set 01 Name _____

Section _____

1. The population $P(t)$ of a bacteria (in millions) is (roughly) given by $P(t) = t^2 + 1$ for $t \geq 0$ (in hours).

a. What is the initial population? Give units. _____

b. Find the average rate of change of the population over the time duration $[2, 5]$. Give units.

c. Find the average rate of change of the population over the time duration between 2 and t. Simplify for $t \neq 2$ and give units.

d. Using limits and Part (c), find the instantaneous rate of change of the population at the moment when $t = 2$ hour. Give units.

10350 Tutorial Week 04 - Set 02 Name _____

Section _____

2. Determine the value of c such that the function $f(x)$ is continuous on the entire real line.

$$f(x) = \begin{cases} \dfrac{|x-3|}{x-3} & \text{if } x < 3 \\ \\ cx + 5 & \text{if } x \geq 3 \end{cases}$$

3. Consider the function $g(x) = \begin{cases} \dfrac{x^2+4x+3}{x+3} & \text{if } x \neq -3 \\ \\ k & \text{if } x = -3 \end{cases}$

a. Find the value of k such that $g(x)$ is continuous at $x = -3$.

b. For what values of k will there be a **removable discontinuity** there?