Name . . . Solution Key . . . . . .

UNIVERSITY OF WYOMING | Math 2200—Spring 2020 | Department of Mathematics

Calculus I

Quiz 1—Friday, January 31

The number of live bacteria $N = N(t)$ in a small colony at time t (in hours) is recorded at hourly intervals, from 1pm to 5pm. The population was recorded in the following table:

t	1	2	3	4	5
$N(t)$	104	191	284	387	506

Determine $\frac{\Delta N}{\Delta t}$, i.e. the average rate of change of the bacteria population per unit time,

(a) during the time interval [1,2];

$$\frac{191-104}{2-1} = 87 \text{ bacteria/hour}$$

(b) during the time interval [2,3];

$$\frac{284-191}{3-2} = 93 \text{ bacteria/hour}$$

(c) during the time interval [2,4];

$$\frac{387-191}{4-2} = 98 \text{ bacteria/hour}$$

(d) during the time interval [2,5].

$$\frac{506-191}{5-2} = 105 \text{ bacteria/hour}$$

Based on these values, *estimate* the instantaneous rate of increase in the bacteria population at 2pm.

$\lim_{\Delta t \to 0} \frac{\Delta N}{\Delta t}$ looks to be 90 bacteria/hour