

Name: _____

Section: _____

Math 111

Group Activity: Population Growth and Percent Change

1. A bacteria colony doubles in size every hour. At noon, there are 1000 bacteria. Let $B(t)$ be the number of bacteria in the colony t hours after noon.

(a) How many bacteria are in the colony at 1:00 pm? 2:00 pm? 3:00 pm? 6:00 pm?

(b) Give a formula that gives $B(t)$ as a function of t .

(c) If $B(t) = 2500$, what is $B(t + 1)$? (That is, if you know that the population is 2500 at time t , what will the population be one hour later?)

(d) If $B(t) = 10,000$, what is $B(t - 1)$? (That is, if you know that the population is 10,000 at time t , what was the population one hour earlier?)

(e) Use your formula from part (b) to answer the following.

i. What is the population at 12:30 pm? at 1:45 pm? at 8:20 pm? (Round to the nearest bacterium.)

ii. When will the colony contain 1,000,000 bacteria? (How many hours after noon?)

iii. Recall that, if a quantity changes from an OLD value to a NEW value, then the percentage change in the quantity is given by

$$\frac{\text{NEW} - \text{OLD}}{\text{OLD}} \times 100\%.$$

What is the percentage change in the population from noon to 12:30 pm?

2. A second colony increases its population by 75% every 30 minutes. There are 5000 bacteria in this colony at noon.

(a) How many bacteria are in this colony at 12:30 pm? 1:00 pm? 1:30 pm? 2:00 pm? 3:00 pm?

(b) By what factor must you multiply the population at one specific time to get the population 30 minutes later?

(c) By what factor must you multiply the population at one specific time to get the population one hour later?

(d) Let $C(t)$ represent the population of this colony t hours after noon. Give a formula for $C(t)$ as a function of t . (Again, you'll need to relate $C(t)$ to the population at noon and use your answer to part (c) of this question.)

(e) When will this population contain 1,000,000 bacteria?

(f) What is the percent change in this population over any one-hour period? (Round to the nearest percent.)