

Name: \_\_\_\_\_

Score: \_\_\_\_\_ /15

## Worksheet 11 (Due Wed, May 21)

Math 1060Q – Summer 2014

Professor Hohn

Three questions will be chosen randomly to be graded. You must show all of your work to receive full credit!

1. Suppose  $f$  is a function with exponential growth such that  $f(2) = 3$  and  $f(4) = 27$ .

(a) Find a formula for  $f(x)$ .

(b) Evaluate  $f(4)$ .

2. Suppose  $f$  is a function with exponential growth such that  $f(3) = 4$  and  $f(5) = 9$ .

(a) Find a formula for  $f(x)$ .

(b) Evaluate  $f(8)$ .

3. Suppose  $f$  is a function with exponential growth and  $f(0) = 1$ . Explain why  $f$  can be represented by a formula of the form  $f(x) = b^x$  for some  $b > 1$ .

4. Suppose a colony of bacteria in a petri dish has 500 cells at 2pm. These bacteria reproduce at a rate that leads to doubling every 3 hours.

(a) How many bacteria will be in the petri dish at 8pm?

(b) How many will be in the petri dish at 9pm?

5. A scientist isolates 270 grams of a radioactive isotope. Three hours later, 10 grams are left. Assuming this isotope decays exponentially, answer the following questions.
- (a) Find a function  $f$  that models the exponential decay of the radioactive isotope.

- (b) If the scientist returns 1 hour later, how much of the isotope will remain?

6. The zombie apocalypse is upon us! Luckily, your math professor escaped unharmed to an underground bunker (where she will continue to do math equations...go figure). From your professor's bunker, she sees two rival factions of zombies battling each other. The first group, called Eye of the Zombie, is growing exponentially. At noon, there were 64 zombies, and at 3pm, there were 125 zombies. The second group, called Don't Stop Braining, is also growing exponentially. At noon, they had 81 zombies, and at 4pm, they had 256 zombies. Your professor wrote all of this information in a handy chart.

Zombie Tribe	12p	3p	4p
Eye of the Zombie	64	125	?
Don't Stop Braining	81	?	256

Your professor wants to know a few things regarding the zombies.

- (a) Model the population of Eye of the Zombie: Find a function  $f$  that models the population growth of the Eye of the Zombie tribe.

(b) Model the population of Don't Stop Braining: Find a function  $g$  that models the population growth of the Don't Stop Braining tribe.

(c) How many Eye of the Zombie members are there at  $4p$ ?

(d) How many Don't Stop Braining members are there at  $3p$ ?

(e) Which escape route to use: Which tribe will have the most zombies by  $6p$ ?