

Homework #8

Instructions: Answer the following questions on a **separate sheet of paper**.

1. Suppose that the population of ants in Pollyanna's ant colony is decreasing at a rate of 3% per year.
 - (a) If she has 1500 ants in 2008, how many will there be in 2060?
 - (b) If she has 1500 ants in 2008, how many were there in 1999?
 - (c) In what year will the number of ants drop below 1000?
 - (d) What is the half-life of the population of Pollyanna's ant colony?

2. Suppose that the population of ants in Felix's ant colony is increasing at a rate of 6% per day.
 - (a) If Felix buys 20 ants, how many will he have in 3 weeks?
 - (b) When will Felix's ant colony reach a population of 100?
 - (c) How often does the number of ants double?

3. Suppose that Pollyanna has a viral infection that is being treated by some herbal remedy, and that the number of viruses is cut in half every 3 days.
 - (a) What percentage of the original viruses are left after 2 weeks?
 - (b) After how many days will the number of viruses be at 16% of the original number?
 - (c) What is the daily decay rate of the viruses? (Hint, use $t = 1$ day.)

4. Suppose that Felix has a viral infection that just won't go away no matter what he tries, and that the number of viruses doubles every 25 weeks.
 - (a) If Felix's infection consists of a modest 22 viruses right now, how many viruses will he have in 5 weeks?
 - (b) If Felix's infection consists of 22 viruses right now,, how many viruses were infecting him 1 week ago?
 - (c) How many weeks will pass until the infection reaches 10,000 viruses?

5. Suppose a quantity Q grows exponentially at a rate of 18% per decade. Compute the doubling time of this growth.

6. Suppose a quantity R decays exponentially at a rate of 44% per month. Compute the half-life of this decay.