Exponential Growth (Assignment 27)

1. Suppose you had a penny that doubled in value every day.

   a) How much would the penny be worth on day three?

   b) How much would the penny be worth on day four?

   c) How much would the penny be worth after x days?

   d) How much would the penny be worth after seven days?

   e) Which would you prefer, $1,000,000 or a penny that doubled in value every day for a month? Show work comparing the value of your two choices.

2. a) When there is the potential for an outbreak of a new disease, medical experts take extreme caution. This is because a virus can spread exponentially if left unchecked. Suppose one person brings back a foreign contagion, and that he infects two new people the first day (so the number of infections triples). If each infected person makes contact with two new people every day and infects them with the disease, how many cases will there be after x days?

   b) How many people will be infected after 2 days?

   c) How many people will be infected after 10 days?

   d) How long would it take for the entire United States (320 million people) to become infected? Guess and check to find the minimum number of days.

3. a) This with explain the math behind what it means to "go viral." You notice a new post on your Facebook page. After watching a few minutes of meaningless nonsense from the video link you see a message that says, "Now repost this on the wall of five of your friends." Let's say you and everyone else who reads it likes the video and decides to comply. If it takes about ten minutes before the next person reads the video and then reposts, how many people will have read the message after 30 minutes?

b) How many people will have read the post after two hours?

4. a) In the springtime, rabbits are known for proliferating very quickly. If there were no predators around, the rabbit population would grow roughly 2.8 times its size each successive spring. In a small forest without predators there are 30 rabbits at the start of this spring. Write an equation describing the number of rabbits x years from now.

b) Approximately how many rabbits will there be after two years?

c) Write an equation that describes the rabbit population after x years.

d) Approximately how many rabbits will there be in one decade?