**Day 22 Different Ways to Grow**

1. Scenario 1: You invest $1000 in an account that pays $50 a year. How much will you have

in 4 years? Assume you make no withdrawals. Show your work.

Scenario 2: You invest $1000 in a different account that pays 5% per year. How much will

you have in 4 years? Assume you make no withdrawals. Show your work.

Which scenario is a better investment? Why?

1. Suppose you place a single bacterium in a bottle at 11:00 a.m. It grows and at 11:01 divides into two bacteria. These two bacteria each grow and at 11:02 divide into four bacteria, which grow and at 11:03 divide into eight bacteria, and so on. Now, suppose the bacteria continue to double every minute, and the bottle is full at 12:00. Assume no bacteria die. Because the bacteria have filled the entire bottle, they are doomed. Maybe this terrible tragedy could have been foreseen. When was the bottle half full?

Good news! Three more bottles have been discovered for the bacteria. Now the bacteria have four bottles total. How long until all the bottles are filled? Justify your answer.

1. You won a contest and need to choose between the following 2 prizes:

Prize 1: Every day $100,000 gets deposited into your Prize Account (beginning balance $0). At the end of 30 days, you cash out the account.

Prize 2: On the first day, one penny is deposited into your Prize Account (beginning balance $0). Every day after the first day, the amount in your account will double. At the end of 30 days, you cash out the account.

Which prize should you take? Mathematically justify your answer.

What if you cashed out the account after 20 days? Would that change which prize you chose?