Name: _____

Sequences and Series.

Please show all arithmetic or calculator steps you use to arrive at the answers. You may write on the back if needed.

1. A brick staircase has a total of 40 steps. The bottom step requires 88 bricks. Each successive step requires two less bricks than the prior step. Is the sequence in this problem geometric or arithmetic?

   a. How many bricks are required for the top step?

   b. How many bricks are required to build the staircase?

2. Suppose someone offers Melissa a job to work for 30 days. On the first day she will be paid 1¢, on the second day 2¢, on the third day 4¢, on the fourth day 8¢, etc. Is the sequence in this problem geometric or arithmetic? If Melissa takes the job, how much is her total pay for the 30 days?

3. Suppose you borrow $3000 on a credit card for holiday shopping. The APR on the credit card is 12.99%; this means the monthly interest you pay equals 1.0825%. You decide to pay $200 each month until this credit card is paid off. In the meantime, you make no additional charges to this credit card.

   a. Compute the interest for one month on the initial $3000 balance.

   b. Add the initial balance $3000 and the interest from part (a). Then subtract from this sum your monthly payment of $200. This number represents your balance at the end of the first month.

   c. Repeat steps (a) and (b) to compute your credit card balance for the end of the 2^{nd}, 3^{rd}, 4^{th}, and 5^{th} months.

   d. What is the name of this type of computation, in which you refer to a previous month to compute next month's balance due? Recursive or explicit?

Name: _____

Sum of an Infinite Geometric Series.

Please show all arithmetic or calculator steps you use to arrive at the answers. You may write on the back if needed.

4. Express $0.\overline{2}$ in fractional notation.

   0.2 + 0.02 + 0.002 + 0.0002 + 0.00002 + . . . is the repeating decimal 0.2222222…. written as an infinite geometric series. Write the repeating number in fraction form by finding the sum of the series.

5. Look at the figure below. What fraction of the square is eventually shaded if the indicated shading process continues indefinitely?