Name: _____
Period: _____

Trout Pond

Review:

1. Write the formula used to find the sum, *S*, of a geometric series containing *n* terms, that increase by a rate equal to *r*, with an initial value of *a*.

2. Write the formula used to find the sum, *S*, of an **infinite** geometric series that increase by a rate equal to *r*, with an initial value of *a*.

3. The formula for question #1 can be used to determine the formula in question #2. Explain how they are related.

Yesterday you worked on a problem that stated a trout population was decreasing at a rate of 20% per year, and 1000 trout were being stocked into the pond each year.

4. Write the recursive formula that represents the trout population.

5. Using this formula, write expressions that represent the first 6 outputs for the recursive equation. DO NOT SIMPLIFY OR MULTIPLY VALUES TOGETHER. Write them out completely to see the pattern develop.

   F(0) =

   F(1) =

   F(2) =

   F(3) =

   ….

   F(n) =

6. Determine a closed form equation for the trout population.

Name: _____
Period: _____

7. Write a recursive equation that can be used to represent a trout population with initial value of C, a growth factor of r, and a restock amount equal to b.

8. Write a closed form equation that represents the recursive equation from question #7. (Hint: Follow the same steps outlined in question #5 and #6.)

Use the closed-form equation to help you make conjectures (educated guesses) about the following questions.

9. If the initial population of trout changes, will this effect the long-term population? EXPLAIN YOUR RESPONSE.

10. If the growth rate changes, will this effect the long-term population? EXPLAIN YOUR RESPONSE.

11. If the restock amount changes, will this effect the long-term population? EXPLAIN YOUR RESPONSE.

12. Will the long-term population always eventually level-off regardless of the values associated with initial population, growth rate, and restocking number?

Name: _____
Period: _____

The table below was made in excel to model the changing trout population as described on the worksheet you received yesterday. Column F was formatted in a manner that when values in column B were adjusted, column F would automatically generate new values representative of the changes made to column B.

13. Make a spreadsheet similar to the one below in Excel. Create the spreadsheet in a manner that allows column F to be dependent on the 3 values found in column B. Any changes made to the values found in Cells B1, B2, or B3 should automatically be reflected in column F.

	A	B	C	D	*E*	*F*
1	**Initial Population, *A*(0)**	**3000**			*n*	*A*(*n*)
2	**Growth Factor, *r***	**0.8**			0	3000
3	**Restock Amount, *b***	**1000**			1	3400
4					2	3720
5					3	3976
6	*Recursive Equation*				4	4180.8
7	$A(n) = r * A(n - 1) + b$				5	4344.64
8					6	4475.712

Use the spreadsheet to verify your responses to questions 9-11.

14. Were any of your conjectures incorrect? If so, which ones?

15. Can you determine the long term population for a pond that has a population decrease of 40% per year, and restocks with 2000 fish each year? If so what is it?

16. Write a formula that calculates the long term trout population for a pond with initial population of C, a growth factor of r, and a restock amount equal to b.