

Problem 2 – Sum of Geometric Sequences

Step 1: Press **STAT** **ENTER** and enter the numbers 1, 2, 4, 8, 16 in list **L1**. Examine L1 to determine the common ratio between the terms.

Step 2: Multiply each of the terms in L1 by the common ratio. Arrow to the top of L2 and enter **L2*(your common ratio)**.

L1	L2	L3	2
1	-----	-----	
2			
4			
8			
16			

L2 = L1 *			

Notice the diagonals of the two columns have the same values. If you subtract the values that are the same, only two values remain.

Step 3: What is the difference between these two values?

Step 4: What number do you need to **divide** your difference value in order to get the sum of the values in L1?

- Rewrite each value in L1 using the common ratio. How can you find the difference value you calculated only using the values in L1?

Step 5: Repeat the steps above for lists:

1, 3, 9, 27, 81 and 1, 4, 16, 64, 256

Remember to clear your lists after each investigation.

- Based upon what you have observed from the three previous investigations, conjecture a formula for the sum of a geometric sequence.

- Apply the formula to find the sum of the following sequences. Show your work.

○ $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}$

○ $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$

○ $1, -2, 4, -8, 16, -32, 64$