

Name \_\_\_\_\_

**Geometric Series** Look at this infinite series:

$$S = 1 - 1 + 1 - 1 + 1 - 1 + 1 \dots$$

We ask: Does it have a sum? Multiply  $S$  through by  $-1$  to get  $-S$ . Write down the expression for  $-S$ . What happens?

Now subtract  $-S$  from  $S$  to get  $2S$ . What happens to the terms of the series? Show how this allows you to “prove” that the sum is  $1/2$ .

Now have a look at  $S$  like this:

$$S = (1 - 1) + (1 - 1) + (1 - 1) + (1 - \dots$$

What do you think the sum is now?

Can you think of a way to group the elements so that the sum may be thought to be 1? Explain.

Here's another series. It is an example of a Geometric Series.

$$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$$

What is the pattern here?

- What is the sum of the first two terms?
- What is the sum of the first three terms?
- What is the sum of the first four terms?
- What is the sum of the first five terms?
- Do you think these "partial sums" getting closer and closer to some number? What is it?
- This is an example of a geometric series. What is the ratio? What is THE sum?