Hence the sum of this infinite collection of numbers $\{1, \frac{1}{2}, \frac{1}{4}, \dots\}$ must be two.

How can we generalize this?

Generalization / Geometric Series

How large is
$$1 + r + r^2 + \dots \qquad \text{if } |r| < 1?$$

Soln: Let $S_n = 1 + r + \dots + r^n$

For $r \geq 0$, $S_1 \leq S_2 \leq \dots$
and we expect $\lim_{n \to \infty} S_n = \sum_{j=0}^{\infty} r^j$