

## The Somos Sequences

Somos- $k$  sequences are calculated from combinations of the  $k$  preceding values. The first  $k$  numbers are always defined as 1.

### EXAMPLE: THE SOMOS-5 SEQUENCE

The first five numbers are 1.

$$a_0 \ a_1 \ a_2 \ a_3 \ a_4 \longrightarrow 1 \ 1 \ 1 \ 1 \ 1$$

The rest of the numbers are given by:

$$a_n = \frac{a_{n-1} a_{n-4} + a_{n-2} a_{n-3}}{a_{n-5}}$$

$$a_5 = \frac{a_4 \times a_1 + a_3 \times a_2}{a_0} = \frac{(1 \times 1) + (1 \times 1)}{1} = 2$$

$$a_6 = \frac{a_5 \times a_2 + a_4 \times a_3}{a_1} = \frac{(2 \times 1) + (1 \times 1)}{1} = 3$$

$$a_7 = \frac{a_6 \times a_3 + a_5 \times a_4}{a_2} = \frac{(3 \times 1) + (2 \times 1)}{1} = 5$$

### THE SOMOS-5 SEQUENCE

$$1 \ 1 \ 1 \ 1 \ 1 \ 2 \ 3 \ 5 \ 11 \ 37 \ 83 \ 274 \ \dots$$

Surprisingly, the Somos-4, 5, 6 and 7 sequences are all whole numbers. Somos-8 and higher have fractions.