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.

\[
\begin{align*}
\alpha_0 & \alpha_1 \alpha_2 \alpha_3 \alpha_4 \quad \rightarrow \quad 1 \ 1 \ 1 \ 1 \ 1 \\
\alpha_6 & = \frac{\alpha_4 \times \alpha_1 + \alpha_3 \times \alpha_2}{\alpha_0} = \frac{(1 \times 1) + (1 \times 1)}{1} = 2 \\
\alpha_6 & = \frac{\alpha_6 \times \alpha_2 + \alpha_4 \times \alpha_3}{\alpha_1} = \frac{(2 \times 1) + (1 \times 1)}{1} = 3 \\
\alpha_7 & = \frac{\alpha_6 \times \alpha_3 + \alpha_6 \times \alpha_4}{\alpha_2} = \frac{(3 \times 1) + (2 \times 1)}{1} = 5
\end{align*}
\]

**THE SOMOS-5 SEQUENCE**

\[
1 \ 1 \ 1 \ 1 \ 1 \ 2 \ 3 \ 5 \ 11 \ 37 \ 83 \ 274 \ \ldots
\]

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