Recurrence relation

A *recurrence relation* is a formula which defines a sequence of numbers by telling you how to get to the next term of the sequence from previous ones.

For instance, the Fibonacci numbers $F(n)$ are defined by the recurrence relation

$$F(n) = F(n-1) + F(n-2)$$
$$F(1) = F(2) = 1,$$

which says that each number in the sequence is equal to the sum of the two previous ones, and also gives the starting values.

Similarly, the sequence of powers of 2 can be defined by

$$a_{n+1} = 2a_n$$
$$a_0 = 1.$$

Sometimes we can find ways to turn a recurrence relation into an ordinary formula which gives the nth term in terms of n, but this is not always easy. For the powers of 2 example, $a_n = 2^n$, but a formula for the nth Fibonacci number is harder to obtain.