THE GENERATING FUNCTION FOR THE FIBONACCI SEQUENCE

Mohammad K. Azarian

University of Evansville

Definition. Let $a_0,\ a_1,\ a_2,\ \ldots,$ be a sequence of real numbers. The function

$$f(x) = a_0 + a_1x + a_2x^2 + \cdots = \sum_{i=0}^{\infty} a_i x^i$$

is called the generating function for the given sequence.

Let F_n $(n \geq 1)$ represent the general term of the Fibonacci sequence

$$1,\ 1,\ 2,\ 3,\ 5,\ 8,\ 13,\ \ldots\ .$$

The generating function for this sequence is

$$\sum_{n=1}^{\infty} F_n x^n,$$

and it is well-known that

$$(1) \qquad \frac{x}{1-x-x^2} = \sum_{n=1}^{\infty} F_n x^n\ .$$