1 Polynomials

1.1 Numeral Systems

1.2 The Algebra of Polynomials

1.3 Factoring Polynomials

1.4 Polynomials and Binomial Coefficients

1.5 The Method of partial Fractions

1.6 The Difference Engine

1.7 More Series

1.8 The closed Form of the Fibonacci Sequence

$$G(x) = F_0 + F_1 x + F_2 x^2 + F_3 x^3 + \dots \tag{1.1}$$

$$G(x) = 0 + x + x^2 + 2x^3 + 3x^4 + 5x^5 + 8x^6 + \dots \tag{1.2}$$

$$xG(x) = F_0 x + F_1 x^2 + F_2 x^3 + F_3 x^4 + \dots \tag{1.3}$$

$$x^2 G(x) = F_0 x^2 + F_1 x^3 + F_2 x^4 + F_3 x^5 + \dots \tag{1.4}$$

$$G(x) - xG(x) - x^2 G(x) = (1 - x - x^2)G(x). \tag{1.5}$$

$$
\begin{array}{lllllll}
(1-x-x^2)G(x) = & (F_0 & +F_1x & +F_2x^2 & +F_3x^3 & +\dots) & - \\
& (& F_0x & +F_1x^2 & +F_2x^3 & +\dots) & - \\
& (& & +F_0x^2 & +F_1x^3 & +\dots) &
\end{array}
$$

$$
\begin{aligned}
(1-x-x^2)G(x) = \quad & F_0 + (F_1 - F_0)x \\
& + (F_2 - F_1 - F_0)x^2 \\
& + (F_3 - F_2 - F_1)x^3 \\
& + \dots
\end{aligned}
$$

$$
(1-x-x^2)G(x) = x. \tag{1.6}
$$

$$
G(x) = \frac{x}{1-x-x^2}. \tag{1.7}
$$