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**Concrete Mathematics - MA 201
Problem Sheet - 8**

1. If $A(z)$ is the generating function for the sequence $\langle a_0, a_1, a_2, \dots \rangle$, then find the sequence corresponding to $A(z)(1 - z)$.
2. Find the generating function associated with the Fibonacci sequence $\langle F_n \rangle$ defined below and find F_n :

$$\begin{aligned}F_0 &= F_1 = 1 \\F_n &= F_{n-1} + F_{n-2} \quad \text{for } n \geq 2.\end{aligned}$$

3. Solve the recurrence relation

$$\begin{aligned}T_1 &= 1 \\T_n &= 2T_{n-1} + 1 \quad \text{for } n \geq 2,\end{aligned}$$

using generating function technique.

4. Solve the recurrence relation

$$\begin{aligned}L_1 &= 2 \\L_n &= L_{n-1} + n \quad \text{for } n \geq 2.\end{aligned}$$

5. A group of n fans of a "winning football team" throw their hats high into the air. The hats come back randomly, one hat to each of the n fans. How many ways are there (denoted by $h(n, k)$) for exactly k fans to get their own hats back?
