Effiziente Algorithmen und Datenstrukturen I

Aufgabe 1 (10 Punkte)

Solve the following recurrence relations:

1. $a_n = a_{n-1} + 6^{n-1}$ with $a_0 = -15$.

2. $a_n = -a_{n-1} + 9a_{n-2} - 11a_{n-3} + 4a_{n-4}$ with $a_0 = -7$, $a_1 = 4$, $a_2 = 48$ and $a_3 = 0$.

Aufgabe 2 (10 Punkte)

Solve the following recurrence relations using generating functions:

1. $a_n = a_{n-1} + 2^{n-1}$ for $n \geq 1$ with $a_0 = 2$.

2. $a_n = 3a_{n-1} - 3a_{n-2} + a_{n-3}$ for $n \geq 3$ with $a_0 = a_1 = a_2 = 1$.

Aufgabe 3 (10 Punkte)

Solve the following recurrence using a generating function:

$$a_n = a_{n-1} + a_{n-2} \text{ for } n \geq 2 \text{ with } a_0 = 0 \text{ and } a_1 = 1.$$

Aufgabe 4 (10 Punkte)

Solve the following recurrence using a generating function:

$$a_n = 5a_{n-1} - 8a_{n-2} + 4a_{n-3} \text{ for } n \geq 3 \text{ with } a_0 = 1, a_1 = 3 \text{ and } a_2 = 11.$$