

Instructions

- Answer each question completely; justify your answers.
- This assignment is due at: 5:00 pm on Monday November 24th.

1. Exercise 7.1.34.

2. Exercise 7.2.2.

3. Assuming that n is a power of 2, solve the following recurrence relations:

(a) $a_n = a_{\frac{n}{2}} + 7, a_1 = 5.$

(b) $a_n = 4a_{\frac{n}{2}} - 5n, a_1 = 2.$

(c) $a_n = 3a_{\frac{n}{2}} + 2n, a_1 = 1.$

4. Solve the following linear recurrence relations:

(a) $a_n = -2a_{n-1} + 5a_{n-2} + 6a_{n-3}, a_0 = 5, a_1 = 5, a_2 = 55.$

(b) $a_n = -2a_{n-1} + 2a_{n-3} + a_{n-4}, a_0 = 5, a_1 = -1, a_2 = -14, a_3 = 33.$

5. Solve the following linear recurrence relation: $a_n = -7a_{n-1} - 9a_{n-2}, a_0 = 0, a_1 = 1.$

6. Solve the following inhomogeneous recurrence relations:

(a) $a_n = 2a_{n-1} + n, a_0 = 17.$

(b) $a_n = 4a_{n-1} - 3^n, a_0 = 1.$

(c) $a_n = 3a_{n-1} - 2n + n^2, a_0 = 0.$

7. Use generating functions to solve the following recurrence relations:

(a) $a_n = a_{n-1} - 3n, a_0 = 3.$

(b) $a_n = 3a_{n-1} + 4a_{n-2}, a_0 = 1, a_1 = 2.$

(c) $a_n = 3a_{n-1} + 2^n, a_0 = 1.$

(d) $a_n = 3a_{n-1} - 2a_{n-2} + n, a_0 = 2, a_1 = 4.$