

## Exercises for Chapter 6

**Exercise 47.** Consider the linear recurrence  $a_n = 2a_{n-1} - a_{n-2}$  with initial conditions  $a_1 = 3, a_0 = 0$ .

- Solve it using the backtracking method.
- Solve it using the characteristic equation.

**Exercise 48.** What is the solution of the recurrence relation

$$a_n = a_{n-1} + 2a_{n-2}$$

with  $a_0 = 2$  and  $a_1 = 7$ ?

**Exercise 49.** Let  $a_n = c_1a_{n-1} + c_2a_{n-2} + \dots + c_ka_{n-k}$  be a linear homogeneous recurrence. Assume both sequences  $a_n, a'_n$  satisfy this linear homogeneous recurrence. Show that  $a_n + a'_n$  and  $\alpha a_n$  also satisfy it, for  $\alpha$  some constant.

**Exercise 50.** Solve the following two recurrence relations:

$$a_n = 3a_{n-1}, \quad a_1 = 4$$

and

$$b_n = 4b_{n-1} - 3b_{n-2}, \quad b_1 = 0, \quad b_2 = 12.$$

**Exercise 51.** Solve the following linear recurrence relation:

$$b_n = 4b_{n-1} - b_{n-2}, \quad b_0 = 2, \quad b_1 = 4.$$