

MH1812 Tutorial

Chapter 6: Linear Recurrence

Q1: Consider the linear recurrence $a_n = 2a_{n-1} - a_{n-2}$ with initial conditions $a_1 = 3, a_0 = 0$.

1. Solve it using the backtracking method.
2. Solve it using the characteristic equation.

Q2: What is the solution of the recurrence relation

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

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

Q3: 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 αa_n also satisfy it, for α some constant.

Q4: Solve the following two recurrence relations:

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

and

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

Q5: Solve the following linear recurrence relation:

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