

Combinatorics, D Term, 2008
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April 22, 2008

Combinatorics Assignment 6

DUE DATE: Thursday, April 24, 4pm. Place in my mail slot in Room SH108.

N.B. Please keep in mind Dr. Martin's rules for Combinatorics assignments.

In each of the five problems below, you are given a recurrence relation, together with initial conditions. Find the characteristic equation, and the general solution a_n, b_n, c_n, d_n, e_n .

1. The sequence a_0, a_1, a_2, \dots satisfies the recurrence relation

$$a_n - a_{n-1} - 12a_{n-2} = 0 \quad (\forall n \geq 2)$$

(a) with initial conditions $a_0 = -3, a_1 = 23$;

(b) with initial conditions $a_0 = 3, a_1 = -2$.

2. The sequence b_0, b_1, b_2, \dots satisfies the recurrence relation

$$b_n - 6b_{n-1} + 9b_{n-2} = 0 \quad (\forall n \geq 2)$$

(a) with initial conditions $b_0 = 1, b_1 = 9$;

(b) with initial conditions $b_0 = 0, b_1 = 3$.

3. The sequence c_0, c_1, c_2, \dots satisfies the recurrence relation

$$c_n - 4c_{n-1} - 3c_{n-2} + 18c_{n-3} = 0 \quad (\forall n \geq 3)$$

(a) with initial conditions $c_0 = -3, c_1 = 16, c_2 = 73$;

(b) with initial conditions $c_0 = 7, c_1 = 14, c_2 = 71$.

4. The sequence d_0, d_1, d_2, \dots satisfies the recurrence relation

$$d_n - 4d_{n-1} + 13d_{n-2} = 0 \quad (\forall n \geq 2)$$

(a) with initial conditions $d_0 = -4, d_1 = -8$;

(b) with initial conditions $d_0 = 1, d_1 = 2$.

5. The sequence e_0, e_1, e_2, \dots satisfies the recurrence relation

$$e_n - e_{n-1} - 2e_{n-2} + 2e_{n-3} = 0 \quad (\forall n \geq 3)$$

(a) with initial conditions $e_0 = 3, e_1 = 1, e_2 = 5$;

(b) with initial conditions $e_0 = 2, e_1 = 2 + \sqrt{8}, e_2 = 2$.