

Objectives: Upon completing this assignment, you will be able to:

1. Recognize linear recurrence relations
2. Check the solution of a recurrence relation.
3. Solve homogeneous linear recurrence relations of orders 1 and 2.

Exercises (20 pts):

1. (6pts) For each recurrence relation below, determine if it is linear. If it is linear, determine all the non-zero coefficients and the nonhomogeneous term (if exists) of the recurrence relation.

(a) $A_n = 2A_{n-1} + 2^n$

(b) $A_n = \log(n)A_{n-2} + 3A_{n-3}$

(c) $A_n = A_{n-1}/A_{n-2} + 1$

2. (6pts) Check that the recurrence relation

$$F_n = 6F_{n-1} - 9F_{n-2} \quad (1)$$

has the following solution:

$$F_n = (\alpha_1 + \alpha_2 n)3^n \quad (2)$$

where α_1 and α_2 are any constants.

3. Find the solution to each recurrence relation below.

(a) (2pts) $A_0 = -2$; $A_n = 3A_{n-1}$ for all $n \geq 1$.

(b) (6pts) $B_0 = 1$; $B_1 = 8$; $B_n = B_{n-1} + 2B_{n-2}$ for all $n \geq 2$.

For full credits, you need to show the process of solving this recurrence relation.

Submission: Hand in a hard copy of your work to the instructor at the start of the class on the due date.

Notes: If you hand-write, please write it clearly, otherwise your homework may be rejected. If you type your homework nicely, you will get **1 point bonus**.

Please also be reminded that this assignment must be done individually. You may discuss the problems (not the solutions) with your classmates, but your submitted work must be written in your own words. Works that too similar may be penalized. Works obtained from an unauthorized source will get no credits.