

## Homework #4

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Assistant: Gizem Süngü

Name:

Student Id:

**Course Policy:** Read all the instructions below carefully before you start working on the assignment, and before you make a submission.

- It is not a group homework. Do not share your answers to anyone in any circumstance. Any cheating means at least -100 for both sides.
- Do not take any information from Internet.
- No late homework will be accepted.
- For any questions about the homework, send an email to gizemsungu@gtu.edu.tr
- The homeworks (both latex and pdf files in a zip file) will be submitted into the course page of Moodle.
- The latex, pdf and zip files of the homeworks should be saved as "Name\_Surname\_StudentId".{tex, pdf, zip}.
- If the answers of the homeworks have only calculations without any formula or any explanation -when needed- will get zero.
- Writing the homeworks on Latex is strongly suggested. However, hand-written paper is still accepted **IFF** hand writing of the student is clear and understandable to read, and the paper is well-organized. Otherwise, the assistant cannot grade the student's homework.

**Problem 1**

(15+15=30 points)

Consider the nonhomogeneous linear recurrence relation  $a_n = 3a_{n-1} + 2^n$ .

(a) Show that whether  $a_n = -2^{n+1}$  is a solution of the given recurrence relation or not. Show your work step by step.

(Solution)

(b) Find the solution with  $a_0 = 1$ .

(Solution)

**Problem 2**

(35 points)

Solve the recurrence relation  $f(n) = 4f(n-1) - 4f(n-2) + n^2$  for  $f(0) = 2$  and  $f(1) = 5$ .

(Solution)

**Problem 3**

(20+15 = 35 points)

Consider the linear homogeneous recurrence relation  $a_n = 2a_{n-1} - 2a_{n-2}$ .

(a) Find the characteristic roots of the recurrence relation.

(Solution)

(b) Find the solution of the recurrence relation with  $a_0 = 1$  and  $a_1 = 2$ .

(Solution)