This is an individual/group project. Groups of **up to three** students can submit joint solutions. For group submissions, please follow the following rules:

Notes regarding groups (If you are submitting the work individually, please skip this part):
For group submissions, please follow the following rules:
1) **Form a Group AGIAN:** First, self-enroll in a group with your partner(s) by navigating to People → Groups → **Assignment4 Group.**
2) **Re-enrollment Required:** Even if you were part of a group before, you must sign up for the Assignment3 Group again, as it is a separate tab under the Groups section.
3) **Submit as a Group**: When submitting the assignment, select the "Group Submission" option. This allows one team member to submit the work on behalf of the entire group, ensuring everyone in the group sees the grade and feedback. Important: **ALL GROUP PARTNER NAMES** should appear on ALL submitted documents.

You may use the Canvas Discussion Board to look for groupmates and create your group.

As it appears in the course syllabus, for the homework assignments, students are encouraged to discuss the problems with others, but you are expected to turn in the results of your own effort (not the results of a friend's efforts)". Even when not explicitly asked, you are supposed to justify your answers concisely.

Question 1)

Write a program in C++/Java to design a **divide and conquer algorithm** that counts the number of **odd elements** in an array of n numbers in **O(n) time**. You should prove formally that your algorithm is linear. Analyze and discuss the reasoning clearly. First write the corresponding **recurrence relation** then solve it to express it in Big-O notation. Show all your work.

Implement a **complete program** in either C++ or Java. No points for any other programming languages.

Deliverables:
1) You need to submit **all your program files** on Canvas in the related digital repository (located under the Assignments section) by the specified deadline. The program should be executed without any issue otherwise no points will be assigned to this submission. **Do NOT zip the files.**

2) As a project **report**, in addition to the code files, **paste your finalized code in the report file** (50% of the obtained grade will be dropped if this part is missed in the submitted report file). The report also should contain the **analysis** of the worst- case time complexity for your programs as requested. Students are expected to show all their work and do not skip the details.

Important NOTE: Don't share your solutions with others to avoid academic dishonesty. All submissions will be checked for that. Academic dishonesty and/or plagiarism in this course will result in a failure of the assignment, or the course, plus an AD report to the department and the university. Please be careful and present the result of your own effort.