Assignment 3: Dynamic Programming

Overview

The goal of this assignment is to familiarize students with dynamic programming algorithms.

Rules and Deliverables

- This is an individual assignment.
- Cheating of any kind is NOT tolerated! Assignments will be checked against each other, and illegal collaboration will be treated based on the University dishonesty policy.
- The due date will be **Monday 3/17/2025 at 11:59pm.**
- Submitting the assignment 24 hours after the due date will result in a deduction of 20% from the student's grade.
- Each student should submit the answers document in a PDF format.
- The assignment must be submitted only through Canvas.

Assignment Description

1. Determine the optimal order and cost for evaluating the product of matrices
   A1×A2×A3×A4, where:

   A1 has dimensions 5×2,

   A2 has dimensions 2×3,

   A3 has dimensions 3×4,

   A4 has dimensions 4×6.

   Construct and display the Cost table (used for optimization) and the K table (used for storing the optimal multiplication order). Show all calculations and steps used in the algorithm. (40 points)

2. As a skilled house robber, you aim to steal from houses along a street, each containing a certain amount of money. However, robbing two adjacent houses will trigger a security alarm.
   Given an array where each element represents the money stored in a house, formulate the dynamic programming recurrence relation to determine the maximum amount you can steal without setting off the alarm. Explain your answer. (40 points)