Walchand College of Engineering, Sangli
Computer Science & Engineering
Third Year
Course: Computer Algorithm Lab
Assignment No. 9

Amortised Analysis

1) **Aggregate Analysis — Dynamic Array Expansion**

In many applications (e.g., text editors, list-based inventory systems), data structures like dynamic arrays (vectors) are frequently resized when capacity is full.

You are to analyze how resizing affects the performance over time.

Implement a dynamic array that:

Doubles its capacity when full.

Tracks the number of element insertions.

Record the cost of each insertion.

Perform aggregate analysis to determine the amortized cost per insertion.

Expected Output:

Operation	Actual Cost	Total Cost	Amortized Cost
Insert 1	1	1	1
Insert 2	2	3	1.5
...	...	...	...

2) Accounting Method — Stack with Multipop Operation

Consider a browser's "Back" button implementation that uses a stack.

Each operation can be:

push(page)

pop()

multipop(k) (pop up to k items in one operation)

Implement stack operations with multipop(k).

Assign amortized costs using the accounting method:

Push = 2 units (1 for push, 1 saved for pop)

Pop = 0 units (use saved credit)

Demonstrate that the total amortized cost of n operations is $O(n)$.