Ch 17

1. a) Aggregate method

Example insert costs

Insert number	cost
1	O(1)
2	O(1)
3	O(1)
4	O(4) → also resizes
5	O(1)
6	O(1)
7	O(1)
8	O(8) → also resizes
9-15	O(1) each
16	O(16) → also resizes

Breaking the cost down:

Simple insertions + complex insertions = ?

↳ O(n) ↳ O(n) → O(4) + O(8) + O(16) + ...

$T(n) = O(n) + O(n) = O(n)$

Now, the amortized cost per insertion = $\frac{T(n)}{n}$

$= \frac{O(n)}{n}$

$= O(1)$

b) Accounting method

Operation	Amortized cost	Actual cost
Simple insertion	3	1
Resizing	Done through credit	O(K)

Now,

1st round : inserting 1,2,3

⇒ 3+3+3 = 9

Subtracting cost 3 : 9-3 = 6

2nd round: inserting 4

⇒ Cost for resizing = 4

Bank = 6-4 = 2

3rd round: inserting 5,6,7

⇒ 2+6 = 8

4th round: inserting 8

⇒ Resize to size 8 has cost 8

⇒ Bank = 8-8 = 0

5th round: inserting 9-17

⇒ Bank = $18

6th round : inserting 18

⇒ Bank = 18-18 = $0

Amortized time per insert is O(1).