Chapter 17

a) Aggregate method:

$c_i = \begin{cases} \text{Cost for insertion with expansion} & = i \\ \text{Cost for insertion without expansion} & = i-1 \text{ when } i = \text{power of 2} \end{cases}$

$$\text{Total cost, } T(n) = \sum_{i=1}^{n} c_i \leq n + \sum_{j=0}^{\log n} 2^j$$

$$< n + 2n$$

$$= 3n$$

$$\text{Am cost} = \frac{\text{Tot cost}}{n}$$

$$= 3n/n = 3$$

$$\text{Am} = \Theta(1)$$

b) Accounting Method

	Actual	Am
Insertion w/o expansion :	1	3
Insertion with expansion :	$(i-1)$	3

$\therefore$ Insertion w/o expansion: Bank is credited \$2 (i.e) $3-1=2$

Insertion with expansion: Bank : $3-(i-1) = 4-i$

Expansion happen only when i = power of 2. $\therefore$ for each expansion, $\frac{i-1}{2}$ insertions

$$\text{Total Cost} = \left(i-1 - \frac{i-1}{2}\right) \times 2 + (4-i)$$

$$= 2\left(\frac{i-1}{2}\right) + (4-i)$$

$$= i-1+4-i$$

$$= 3$$

$\therefore$ The Am cost for insertion is 3.

Since bank balance ≥ 0 at all times.

$\therefore$ Am: $\Theta(1)$