Hands-on 11

(a) Use the aggregate method in the aggregate method we consider the total cost across all the insertions and calculate the average cost per insertion.

when inserting the i^{th} element, if a resize operation is not needed the existing happens cost $O(i)$ as it involves copying the existing elements to the new table of size $2k$ (k is no. of resizes performed).

Total cost = $O(n)$ $K \Rightarrow O(n \log n)$

cost per insertion = $O(\log n)$

Runtime per insertion = $O(\log n)$

Total time is $O(n) * \log(n+1)$

(b) Accounting method.

In this method, we assign each insertion a higher amortized cost the store credits that pay for future resizing costs.

Pseudo code -

```
for i=1 to n
    if table is full
        newtable = create new table
        with size then copy elements
        from old table to new table
        table = new table
    insert element i into table
```

initial charge = 0

for i = 1 to n

charge += 2

If table doubled in size from

into 2m

credits += m

total charge = 2 * n = O(n)

total credits = m + 2m - —— $\frac{n}{2}$ * m = O(n)

Amortized cost per insertion

= total / n

= O(n/n)

= O(1)

Runtime per insertion O(1)

Total time O(n)