HW-17

Pradeepsinh A Chavda

1002231638

1) inserting n element using

a) aggregate method.

The table doubles in size when it runs out of space. So if the original size is 1, after insertion it doubles the size to 2. after 2 more insertion it doubles to size 4.

After k doubling the size is 2^k

Pseudo code

```
initialize table with capacity 1
    for i=1 to n;
        if table is full:
            new table = create newtable with
                size 2* current size
            copy elements from old table to new table
            table = new table
        insert element i into table
```

$k = \log(n+1) - 1$

Total cost $= O(n)k$

$= O(n \log n)$

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

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

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

b) accounting method.

Change 2unit for each insertion.
when the table double in size from m to 2m,
Credit m units.

Total credit is $m + 2m + 4m + 6m$..

$n/2 * m = O(n)$

Pseudo code

```
Iniatialize table with capacity = 1
for i=1 to n
if table is full:
new table = Create newtable
with size x current size
Copy element from old table
to new table
```

```
insert element i into table
    iniatialize   changes = 0
    initialize    credits = 0

for i=1 to n:
        changes += 2
        if table doubled in size
        from m to 2m
            credits += m
        Total charges = $2*n = O(n)$
    Total credits = $m + 2m ...$
                $n/2 * m = O(n)$
    Cost per insertion = total/n = $O(n)/n$
                $= O(1)$
    Runtime per insertion = $O(1)$
        Total time = $O(n)$.
```