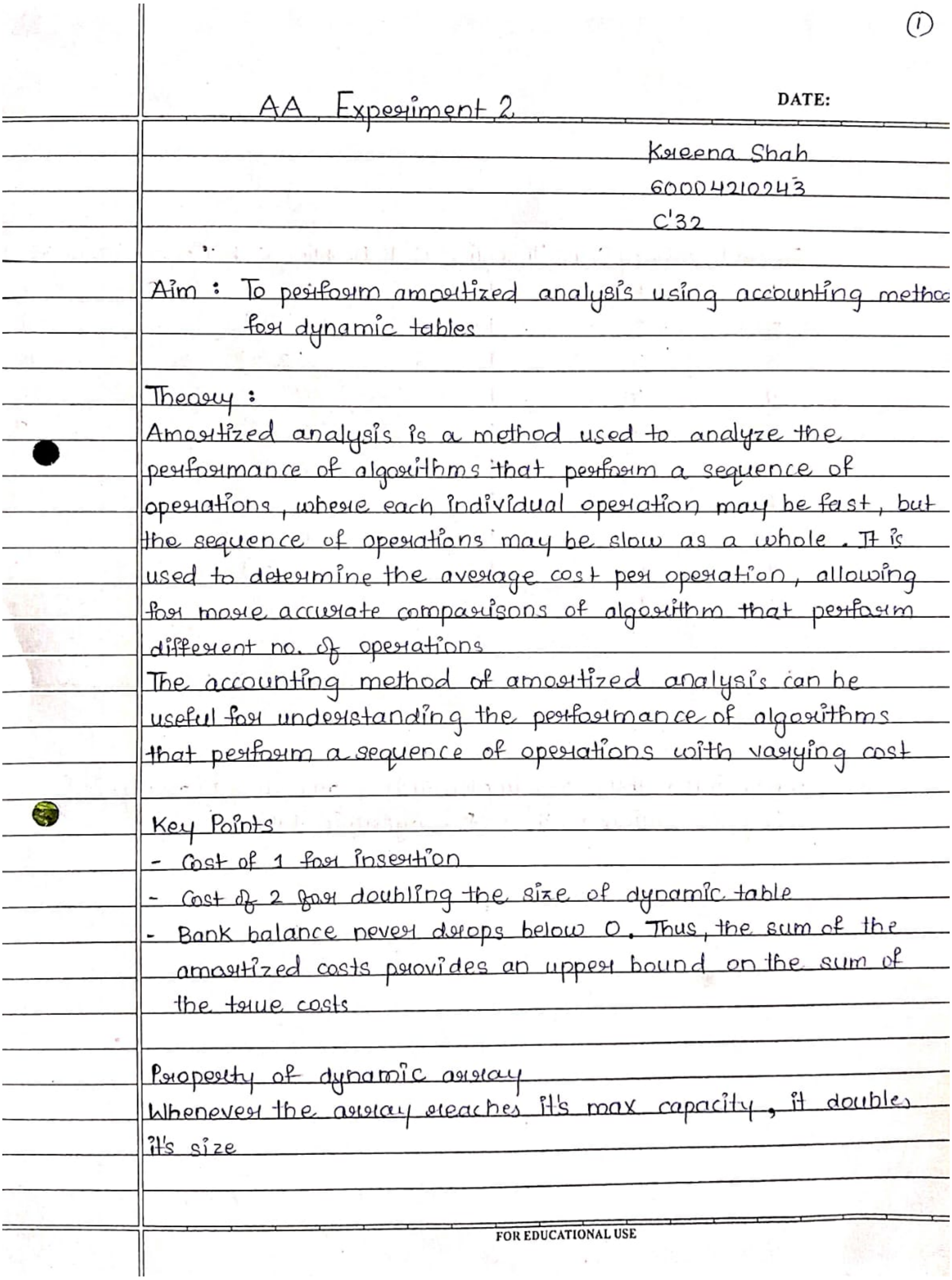
Experiment 2



AA Experiment 2

DATE:

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Aim : To perform amortized analysis using accounting metho
for dynamic tables

Theory :

Amortized analysis is a method used to analyze the performance of algorithms that perform a sequence of operations, where each individual operation may be fast, but the sequence of operations may be slow as a whole. It is used to determine the average cost per operation, allowing for more accurate comparisons of algorithm that perform different no. of operations

The accounting method of amortized analysis can be useful for understanding the performance of algorithms that perform a sequence of operations with varying cost

Key Points

- Cost of 1 for insertion
- Cost of 2 for doubling the size of dynamic table
- Bank balance never drops below 0. Thus, the sum of the amortized costs provides an upper bound on the sum of the true costs

Property of dynamic array

Whenever the array reaches it's max capacity, it doubles it's size

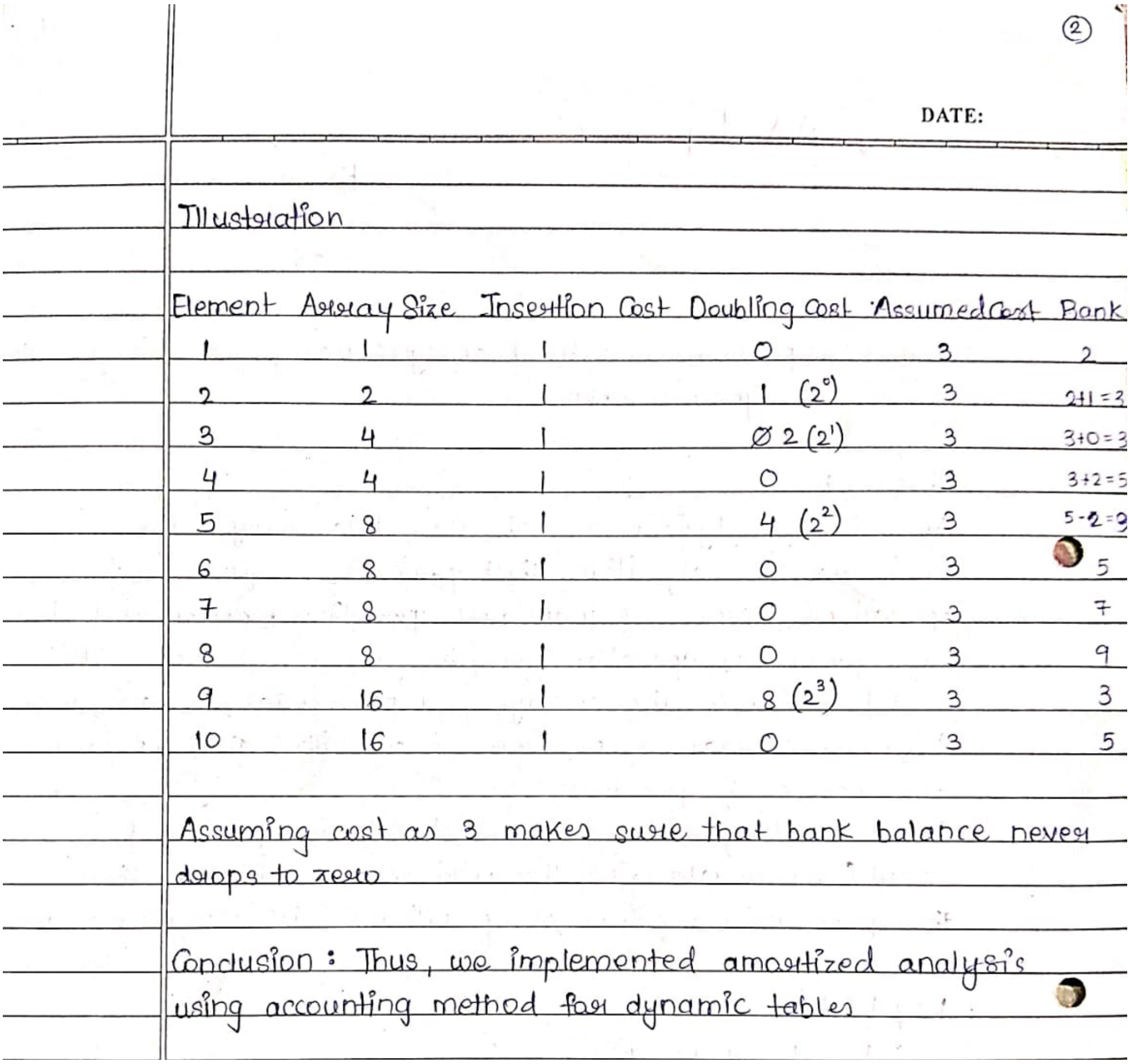

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Illustration

Element	Array Size	Insertion Cost	Doubling Cost	Assumed Cost	Bank
1	1	1	0	3	2
2	2	1	1 (2^0)	3	2+1=3
3	4	1	~~0~~ 2 (2^1)	3	3+0=3
4	4	1	0	3	3+2=5
5	8	1	4 (2^2)	3	5-2=3
6	8	1	0	3	5
7	8	1	0	3	7
8	8	1	0	3	9
9	16	1	8 (2^3)	3	3
10	16	1	0	3	5

Assuming cost as 3 makes sure that bank balance never drops to zero

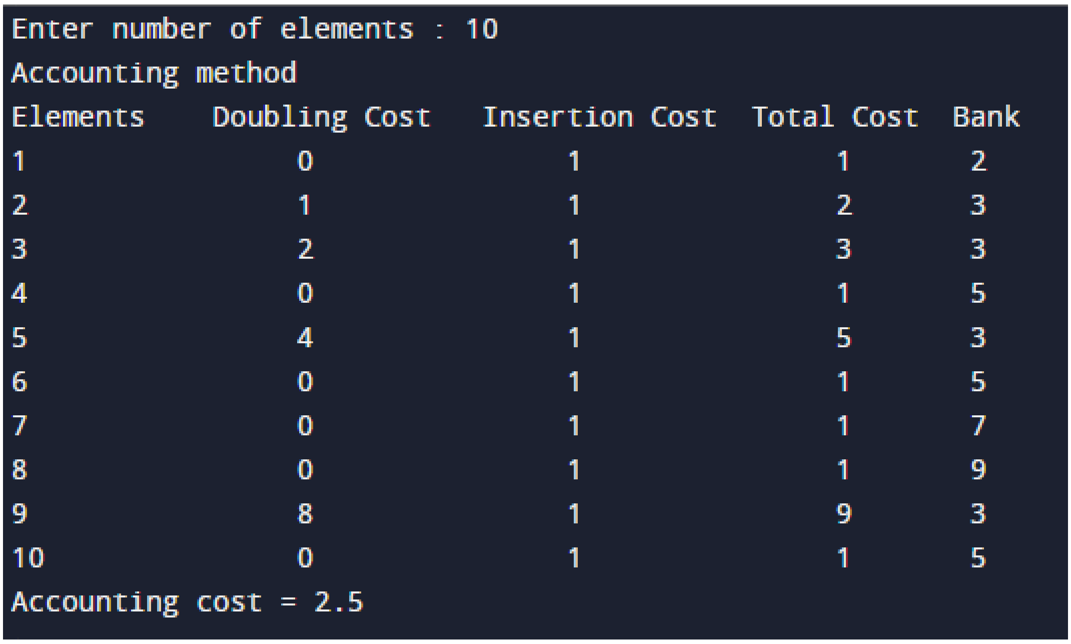
Conclusion : Thus, we implemented amortized analysis using accounting method for dynamic tables

Code :

```
def accounting(n):
    size=1
    total=0
    dcost=0
    icost=0
    bank=0
    totalfinal=0
    print('Elements\tDoubling Cost\tInsertion Cost\tTotal Cost\tBank')

    for i in range(1,n+1):
        icost=1
        if i>size:
            size*=2
            dcost=i-1
        total=icost+dcost
        totalfinal=total+totalfinal
        bank+=(3-total)
        print(i,'\t\t\t\t',dcost,'\t\t\t\t',icost,'\t\t\t\t',total,'\t\t',bank)
        icost=0
        dcost=0
    return totalfinal/n
n=int(input('Enter number of elements : '))
print('Accounting method')
a=accounting(n)
print('Accounting cost =',a)
```

Output :



```
Enter number of elements : 10
Accounting method
Elements     Doubling Cost    Insertion Cost   Total Cost   Bank
1                 0                1                1         2
2                 1                1                2         3
3                 2                1                3         3
4                 0                1                1         5
5                 4                1                5         3
6                 0                1                1         5
7                 0                1                1         7
8                 0                1                1         9
9                 8                1                9         3
10                0                1                1         5
Accounting cost = 2.5
```