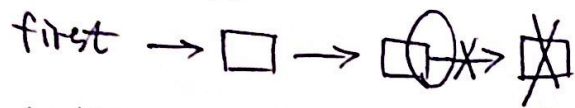


Xinman Liu HW5 - CSC402

1. (1.3.19)



```
public void delete() {
```

```
    Node tmp = null;
```

```
    for (tmp = this.first; tmp.next.next != null; tmp = tmp.next) {
```

```
        tmp.next = null;
```

```
    }
```

2. (1.4.5).

a. $(N+1) \sim N$

b. $(1 + 1/N) \sim 1$

c. $(1 + 1/N)(1 + 2/N) = (\frac{2}{N^2} + \frac{3}{N} + 1) \sim 1$

d. $(2N^3) - 15N^2 + N \sim 2N^3$

e. $\lg(2N) / \lg N \Rightarrow \frac{\lg 2 + \lg N}{\lg N} = \frac{\lg 2}{\lg N} + 1 \Rightarrow \sim 1$

f. $\lg(N^2 + 1) / \lg N \Rightarrow \frac{\lg N^2}{\lg N} = 2, \frac{\lg N}{\lg N} = 1 \Rightarrow \sim 2$

g. $N^{100} / 2^N$ $\because N$ will go to infinity ∞ , $\therefore \sim 0$

3. (1.4.6)

a. $\text{sum} = N + \frac{1}{2}N + \frac{1}{4}N + \dots + 1$; if $N \neq 2 \Rightarrow 0$, $\text{sum} = N - 1 \sim N$

b. $\text{sum} = 1 + 2 + \dots + \frac{1}{2}N$; if $N \neq 2 \Rightarrow 0$, $\text{sum} = \frac{N}{2} - 1 \sim N$

c. $\sim (N * \log N)$

Write the answers to these problems on paper. Scan the paper and upload to the submissions folder. We will grade a random subset of these for credit.

1. 1.3.19 (You may assume the list has at least one node).
2. 1.4.5 (show your work)
3. 1.4.6 (it might help to try some small values of N – see if you see a pattern).
4. Review the Java program on the next page.

Carefully compare the two functions: `addTwoIntsNtimes`, `addThreeIntsNtimes` and review how they are called from `main`.

Answer the three questions Q1, Q2, Q3 in the comments in the main function.

- Q1. ~~time1~~ The average time to run `addTwoIntsNtimes(reps)`, when $\text{reps} = 10000$, time1 (as known as average time) is $6.0E-7$;
- Q2. ~~time2~~ The average time to run `addThreeIntsNtimes(reps)`, when $\text{reps} = 10000$, time2 (average time) is $2.0E-7$;
- Q3. ~~diff~~ $\text{time2} - \text{time1} = 2.0E-7$;

The difference of average time to run two functions, when $\text{reps} = 10000$, $\text{diff} = -4.000000E-07$

5. Create a java program with this class and run it using the values in the table below. (You will need to change the value of the variable `reps` in the program). Record the value printed in the table.

Reps	Printed value of diff
10000	$-3.000000E-07$
100000	$-2.000000E-08$
1000000	$-6.000000E-09$ $1.000000E-09$
10000000	$1.900000E-09$
100000000	$-2.700000E-09$ $2.610000E-09$
1000000000	$5.790000E-09$