

Agenda:

1. Iteration Problems.
 2. Output Prediction
 3. Basic debugging.
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Problem:

1. function constant():
 print("Hello");

1. Times print is executed $\rightarrow 1$
2. TC $\rightarrow O(1)$
3. SC $\rightarrow O(1)$

2. function iterate(N):
 for i (1 \rightarrow N):
 print(i);

1. Times print is executed $\rightarrow N$
2. TC $\rightarrow O(N)$
3. SC $\rightarrow O(1)$

3. function analyse(N):
 for (i: 1 → N):
 for (j: 1 → N):
 print(i, j);
 for (i: 1 → N):
 for (j: 1 → N):
 print(i+1, j+1);

1. Times print is executed → $2N^2$
2. TC → $O(N^2)$
3. SC → $O(1)$

4. function scale(N):
 i = 1
 while (i < N):
 print(i)
 i = i * 2

1. Times print is executed → $\log_2 N$
2. TC → $O(\log N)$
3. SC → $O(1)$

$$5N^2 + 3N + 500 \rightarrow$$

$$5N^2$$

$$\underline{\underline{O(N^2)}}$$

$$2^{10} = \underline{\underline{1024}}$$

$$10^2 = \underline{\underline{100}}$$

Q3:

$$1st\ loop \rightarrow N^2$$

$$N^2 + N + 2^N$$

$$2nd\ loop \rightarrow N$$

$$3rd\ loop \rightarrow 2^N$$

$$2^N \text{ or } N!$$

$$32$$

$$120$$

$$10! = \underline{\underline{10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}}$$

$$10^{10}:$$

$$N! \text{ or } N^N$$

$$10!$$

$$N \rightarrow N$$

$$\rightarrow \underline{\underline{N+M}} \rightarrow \underline{\underline{O(N+M)}}$$

$$M \rightarrow M$$

fun(n):

$$s=0;$$

$$\text{for } (i: 1 \rightarrow 100): \quad \underline{\underline{100}}$$

$$s = s + i;$$

return s;

$$\underline{\underline{O(1)}}$$

fun(N):

$$s=0$$

$$i=0$$

while (i < N)

$$s = s + i$$

$$i = i \times 2;$$

return s;

Outer loop : $i: 1 \rightarrow N$

inner loop : $1 \rightarrow i$

$$1 + 2 + 3 + 4 + \dots + (N+1)$$

$$\frac{(N+1)(N+2)}{2} = N^2 + \dots$$

$$= \underline{O(N^2)}$$

$$\frac{i}{0} \quad \frac{j}{1}$$

$$1 \quad 2$$

$$2 \quad 3$$

$$3 \quad 4$$

$$4 \quad 5$$

$$N \quad N+1$$

for ($i: 1 \rightarrow 100, i \rightarrow i * 2$) $\rightarrow 6$

for ($j: 1$ to N) $\rightarrow N$

1 print:

$$\underline{6 \times N} \rightarrow \underline{O(N)}$$

$$\log N$$

$$1$$

$$N^N$$

$$4$$

$$N!$$

$$3$$

$$2^N$$

$$2$$

$$f_1 \rightarrow N \log N$$

$$f_2 \rightarrow N$$

$$f_4, f_2, f_1, f_3$$

$$f_3 \rightarrow N^2$$

$$f_4 \rightarrow \log N$$

Output Prediction:

1. function ex()

for i(1 → 6)

if (i % 2 == 0)

print(i, " is even");

2 is even

4 " "

6 " "

2. fun1():

print("Start")

fun2()

print('End')

fun2():

print("Inside fun2");

fun1();

3. fun loop():

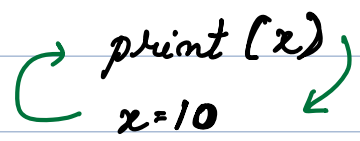
i = 1;

while (i < 10):

print(i)

i++;

4. func test():

 print(x)
x=10

5. func offByOne(N):

for(i: 0 → N):

print i;

N=5 0, 1, 2, 3, 4, 5

⇓

Get everything clarified
before proceeding.

void example() {

x=10;

for (int i=1; i<=5; i++)

{ x=x-2;

if (x % 3 == 0)

{ continue;

}

print(x);

}

}

x=10:

<u>i</u>	<u>x</u>
1	8
2	6
3	4
4	2
5	0

8 4 2

0 % N →

Q13:

fun():

for (i=1; i!=10; i=i+2)

print(i);

Q 14:

example()

for (i=1; i<=4; i++)

{ if (i%2==0 ~~||~~ i*2 < 7)

{ print(i);

}

}

}

i

1

2 ✓

3

4

Q 15