

CS2 101 2-1-24

1

How to measure runtime?

- choose some basic operation(s) in the algorithm, count # executions of that op.

Ex

OP1
for $i = 1$ to 10

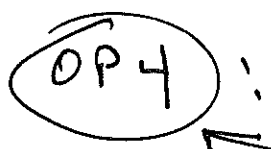
OP2
for $j = 1$ to 10

OP3
for $k = 1$ to 10

OP4

executions

OP1 : 1
 OP2 : 10
 OP3 : 100
 OP4 : 1000



count this,

why not count all ops?

EX.

OP
 for i = 1 to n

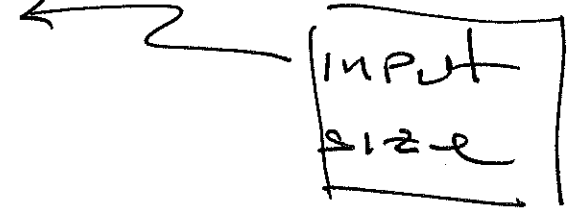
OP
 for j = 1 to n

OP
 for k = 1 to n

OP

let $T(n)$ be # basic ops on

input of size n



$$T(n) = n^3 + n^2 + n + 1$$

Restate question: why not toss out

n^2 , n and 1 . left with n^3 .

We care about what happens

as $n \rightarrow \infty$.

$$\lim_{n \rightarrow \infty} \frac{T(n)}{n^3} = \lim_{n \rightarrow \infty} \frac{n^3 + n^2 + n + 1}{n^3}$$

$$= \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n} + \frac{1}{n^2} + \frac{1}{n^3} \right) = 1$$