

Basis of Time and Space Complexity

Algorithm Analysis

Time

Space

Problem Statement

func1 ↗

2.5 sec
Vikash

↓
Anirudh ↗ func2

⇒ 3.5 sec.

C.P.U

V ⇒
5 GHz
|

C.P.U

A ⇒
3 GHz

✓✓

$$\boxed{5 \times 1024 \\ \times 1024 \\ \times 1024}$$

$$3 \times 1024 \\ \times 1024 \\ \times 1024$$

Ops per
Sec

Ops per Sec

CPU Clockspeed

⇒ Measure the TC based
on no of iterations

⇒ N

$$\text{func}() \Rightarrow \boxed{n^{**2}}$$

$$\boxed{\text{func} + \text{A}() \Rightarrow \boxed{n}}$$

1

10 n \Rightarrow 100 ops

10 n \Rightarrow 10 ops

Big O \Rightarrow asymptotic
Notation

\rightarrow Measure TC in terms
of number of iteration
as N approaches
infinity.

\Rightarrow Ignore Constants
and Co-efficients

\Rightarrow Only care about the
Trend. \downarrow

*
Highest degree
of n

$n \Rightarrow 2$	$\Rightarrow 2$	$\Rightarrow 1$
$n \Rightarrow 4$	$\Rightarrow 2$	$\Rightarrow 2$
$n \Rightarrow 8$	$\Rightarrow 2$	$\Rightarrow 3$

$n \Rightarrow \left| \begin{array}{c} \text{---} \\ \text{---} \end{array} \right| \begin{array}{c} \text{---} \\ \text{---} \end{array} \leftarrow$

$\log_2 n \Rightarrow \log_2 2$

$\log_2 n \Rightarrow 1 \times \log_2 2$

$1 \Rightarrow \log_2$

$$32 \Rightarrow \log_2 32 + 1$$

$$\log n^q$$

$$q \log n$$

$$\log n^q$$

$$\log_3 n$$

def factorial(x):

if x == 1:

x + 1 ← ✓

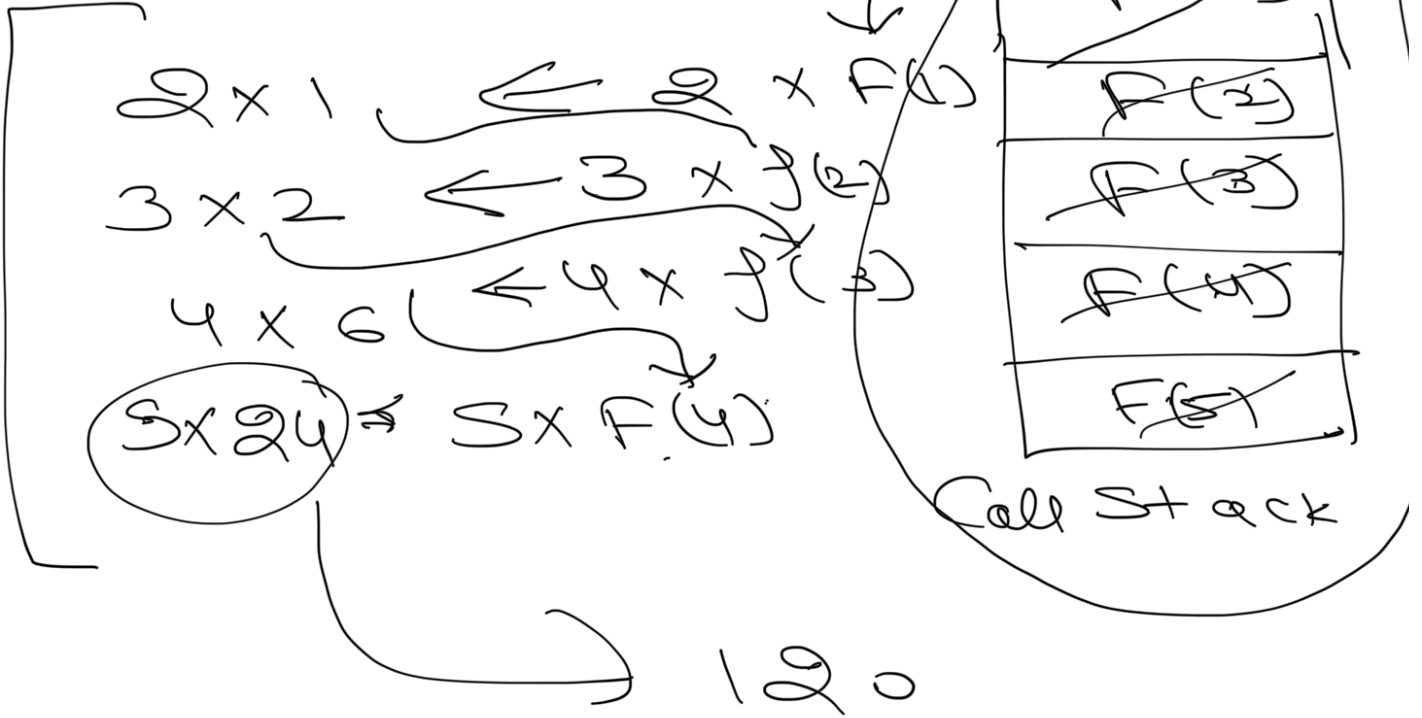
else

* p(x-1) ←

set x j n

$$n=5$$

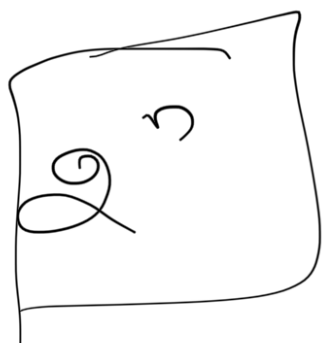
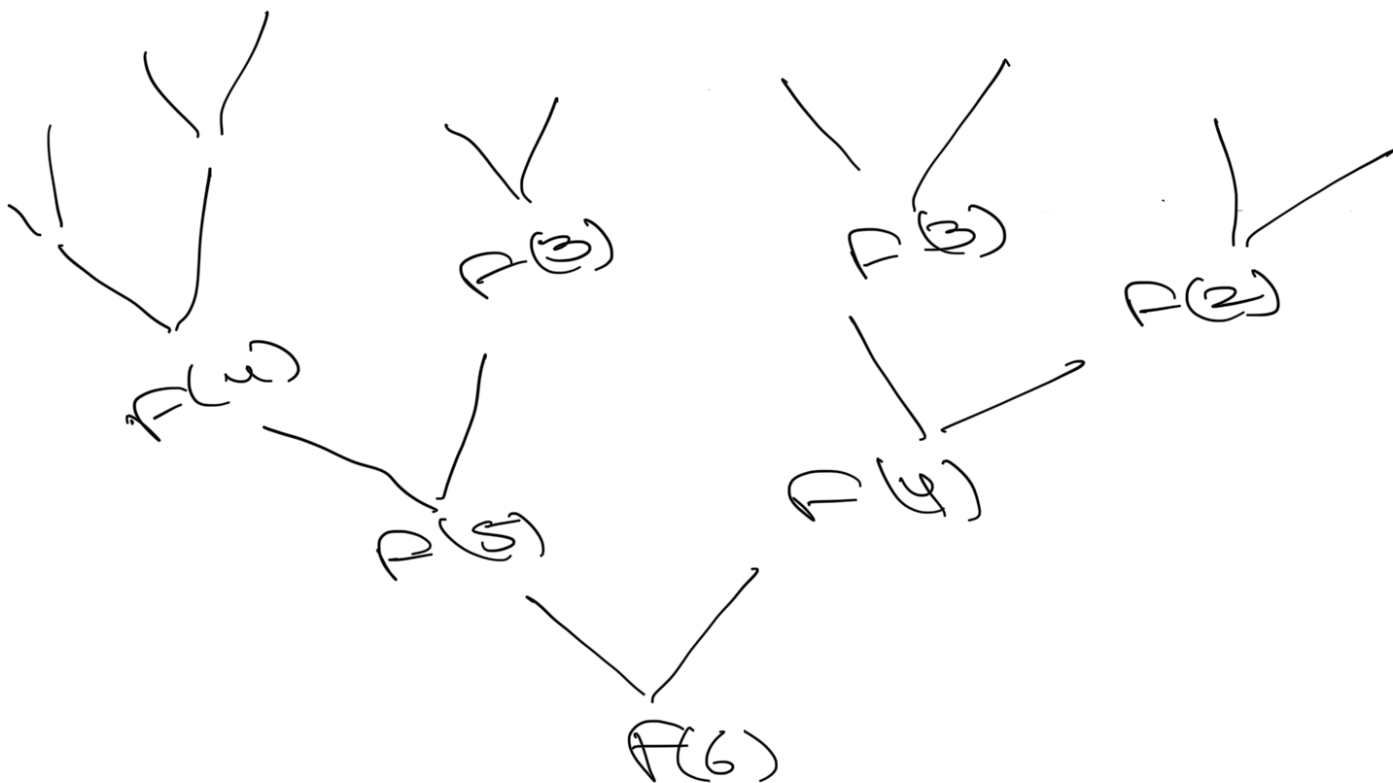
$f(n)$



$n \rightarrow 5$

T.C $\Rightarrow O(n)$

Sc $\Rightarrow O(n)$



SS Q^8

$$\rightarrow F(5) \rightarrow F(n-1) + F(n-2) + F(n-3)$$

$$\rightarrow 3^3$$