# MK

# CONCRETE MATHS

MUHAMMAD FARHAN NIAJ NEEBIR
1005058

14.9.201

TOH (n, A, B, C)

$\overset{\text{source}}{A}$, B, $\overset{\text{dest}}{C}$

{

if n = 1 then

move the disk to destination.

else

TOH (n-1, A, C, B)

TOH (n-1, B, A, C)

}

$\therefore$ no of moves, $T(n) \geq \begin{cases} 2T(n-1)+1 \\ 1 \quad \text{if } n=1 \end{cases}$

15.9.2014

Missing

16.9.2014

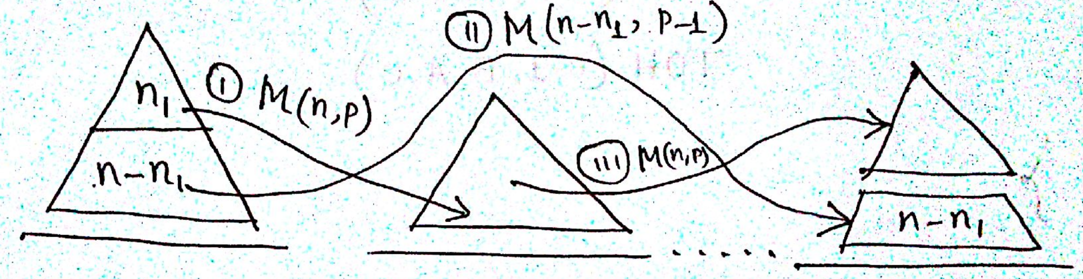
TOH

C TOH

D TOH

MP TOH $(n, P, s, d, P)$

Presumed Optimal Solution (POS)




MPTOH $(n, P, s, d, P)$

If $n=1$ then

$s \to d$

else

$n_1 = f(n,P)$

MPTOH $(n_1, P, s, i, P)$

MPTOH $(n-n_1, P-1, s, d, P)$

MPTOH $(n_1, P, i, d, P)$

endif

Property 1: In POS strategy every disk requires $2^k$ moves to reach destination.

$$M(n,P) = \min\left\{2M(n_1,P) + M(n-n_1,P-1)\right\}$$

$$0 \leq n_1 < n$$

$N(k,P)$ — maximum no of disks each of which requires $2^k$ moves to reach destination.

P2: $N(k,P) = N(k-1,P) + N(k,P-1) = \binom{P-3+k}{k}$

To prove

$$\sum_{i=0}^{K_{max}-1} N(i,P) < n \leq \sum_{i=0}^{K_{max}} N(i,P) = \overline{N}(K_{max},P)$$

$$\overline{N}(K_{max}-2,P) \leq n_1 \leq \overline{N}(K_{max}-2,P) + \min\left\{N(K_{max}-1,P), N_a(K_{max})\right\}$$

$n$

$$N_a(K_{max},P) = n - \overline{N}(K_{max}-1,P)$$

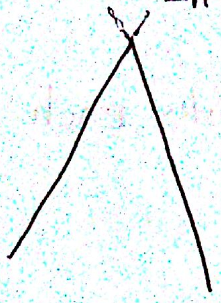
$\boxed{19.10.2014}$

# Recurrent Problems

1. TOH — DTOH, CTOH, MTOH
2. Lines in the plane
3. Josephus problem

$$L_n = \begin{cases} 1 & n = 0 \\ L_{n-1} + ((n-1)+1) & \text{Otherwise} \end{cases}$$

$Z_n = L_{2n} - 2n$



$Z_n =$

$ZZ_n =$

$$P_n = \begin{cases} 1 & \text{if } n = 0 \\ P_{n-1} + L_{n-1} \end{cases}$$

1 2 4 8 16 32

1 1 1 1 1 1

$n = 2^m + l$

$J(n) = 2l + 1$

$\sum_{k=0}^{n} a_k =$

1

$x_{2n}$ 2 x $J(2n) = 2J(n) - 1$

2n-1

6 5 4 x $J(2n+1) = 2J(n) + 1$

x 1 2n+1 2 x 3

x 2n

$1 + 1.7 + \dots + 4.2.7$

2. Sum

$1+2+ \dots + n$

epilepsises

$1+ \dots + n$

$1+2+ \dots + (n-1) + n$

$$k + \sum_{k=0}^{n} a_k = a_0 + a_1 + \dots + a_n$$

1820 Fourier

$$\sum_{k=0}^{n} a_k = \sum_{0 \le k \le n} a_k = \sum_{0 \le k \le n} a_k = a_0 + a_1 + \dots + a_n$$

Prediction

$$\int_a^b \sin x \, dx = \int_a^b \sin y \, dy$$

summation factor is similar to integrating factor.

$$\sum_{k=1}^{\infty} \frac{1}{k(k+1)} = \sum \left( \frac{1}{k} - \frac{1}{k+1} \right)$$

$$= \frac{1}{1} - \cancel{\frac{1}{2}} + \cancel{\frac{1}{2}} - \cancel{\frac{1}{3}} + \cancel{\frac{1}{3}} - \frac{1}{4} + \dots$$

$$= 1$$

20.10.2014

mod (

## Assignment :

problems in chap no.

mod (chapter no. * 10 + exercise no , ) =

mod (roll no , problems in chap no)

22 Ch #

No. 06

$\text{mod}\,(1 \times 10 + \text{exno}, 26) = \text{mod}\,(60, 26)$

$\therefore \text{exno} = 24$

$= 8$

mod = (58, 26)

= 6

$\lceil x \rceil - \lfloor x \rfloor = [x \text{ is not an integer}]$

Iversion's notation

28.10.2014

Xtra Class

Tuesday

27.10.2014

$J(1) = 1$

$J(2n) = 2J(n) - 1$

$J(2n+1) = 2J(n) + 1$