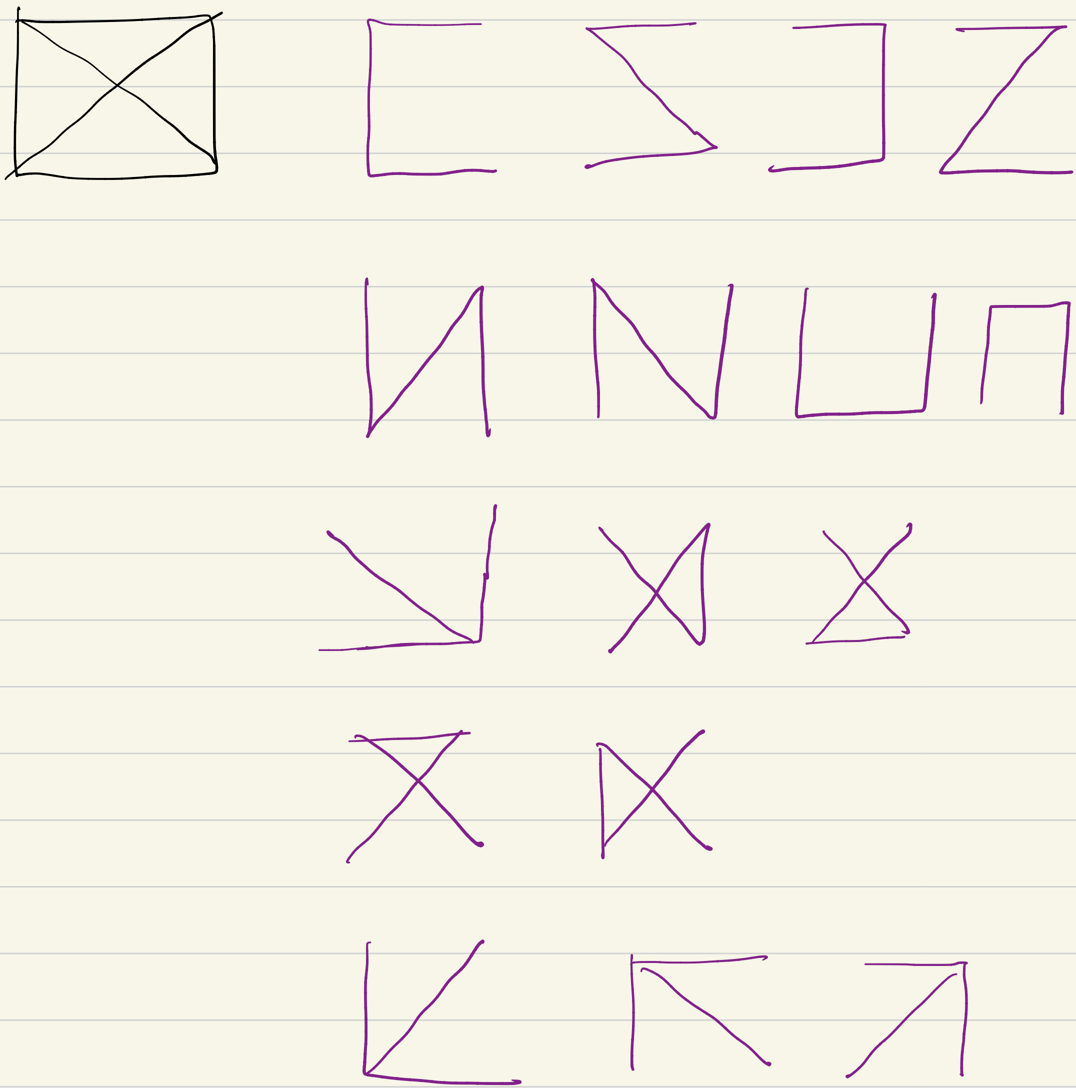


Lecture - 1

- SETS & FUNCTIONS. notation.
- Constructing numbers in base b;
- Induction ...... Boolean connectives.

PI:

$\mathcal{U}$ = Universe

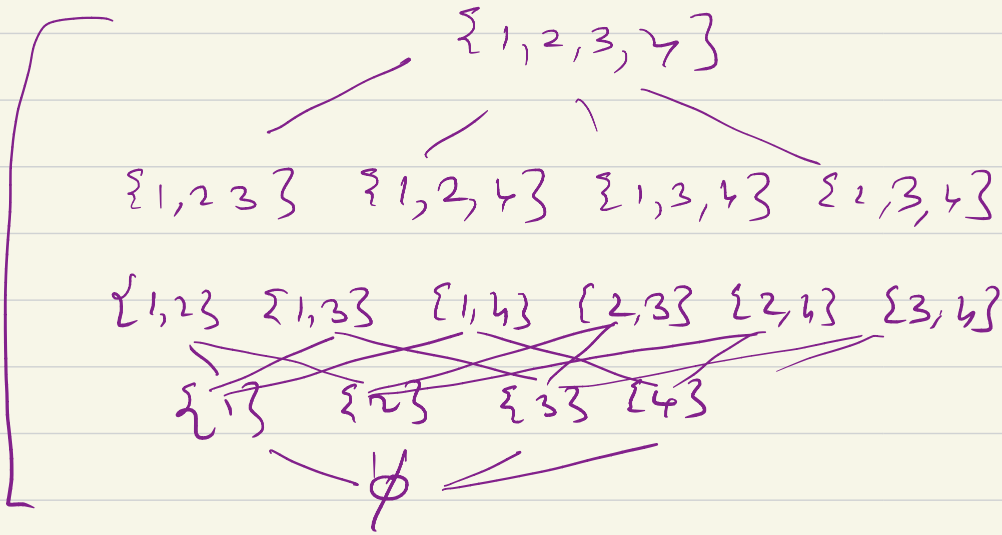
$\{x_1, \ldots\ldots, x_n\}$.

$\emptyset \qquad \{\emptyset\}$

$A \subseteq B$

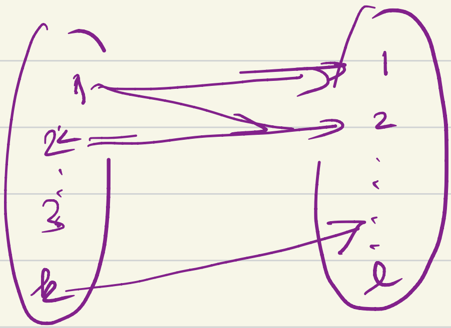
$\bar{n} = \{1, 2, 3, 4\}$.

$A \subsetneq B$



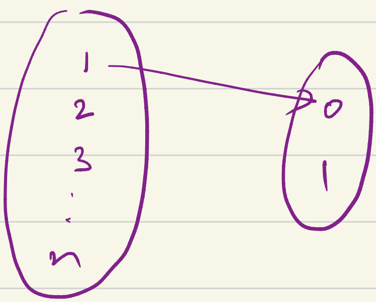
$$f : S_1 \longrightarrow S_2$$

$S_1 = \{1, \dots k\}$ $\qquad$ $S_2 = \{1, \dots . l\}$.

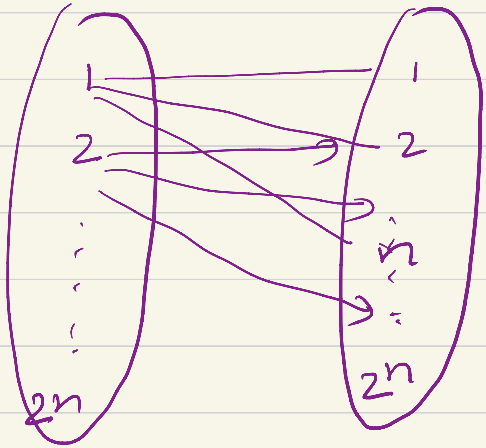


Relation:

$\{(1,1)(1,2), (2,2), (3,3), \dots (k,k)\}$.



2^n functions



$(2n)^n$

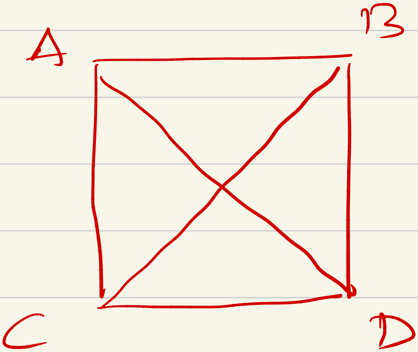
$2^n \quad n^n$

How many bijective functions from this relation?

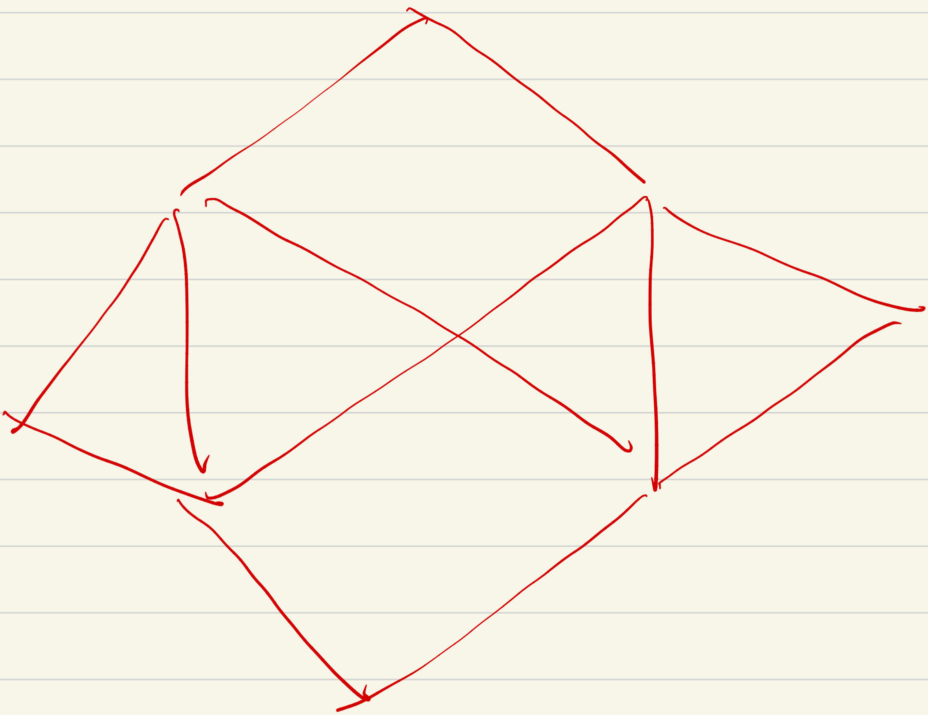
Write a program! # operations?

[WE DO NOT KNOW OF A PROGRAM WHICH TAKES SUBEXPONENTIAL # steps]

in the size of the input.



N



$x_1, \ldots\ldots x_k.$

$x_i \in \{0, 1\},$

$$(x_i \vee x_j) = \max\{x_i, x_j\}$$

$$(x_i \wedge x_j) = \min\{x_i, x_j\}.$$

$$\neg x_i \hat{=} \overline{x_i}$$

$$(x_1 \vee \overline{x_2} \vee x_3) \wedge (x_1 \vee x_4 \vee x_6) \wedge$$

$$(x_7 \vee x_8 \vee x_9) \wedge (\overline{x_2} \vee \overline{x_4} \vee x_{10}) \wedge$$

$$- \quad - \quad -$$

Q: Is there an assignment of values to $x_1, \ldots, x_{40}$ which makes the expression True.

— x — x — x ——

PROGRAM:[2]

Again, we only know of a brute force solution. Nothing better than exponential in

n, m

n: # literals

m: # clauses.

This is believed to be easier than finding # bijections in relations.