

Subsets of

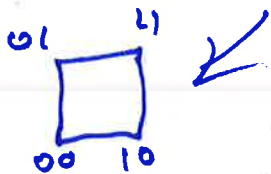
$\emptyset :$

\emptyset

$$\mathcal{P}(\emptyset) = \{\emptyset\}$$

$\{1\} :$

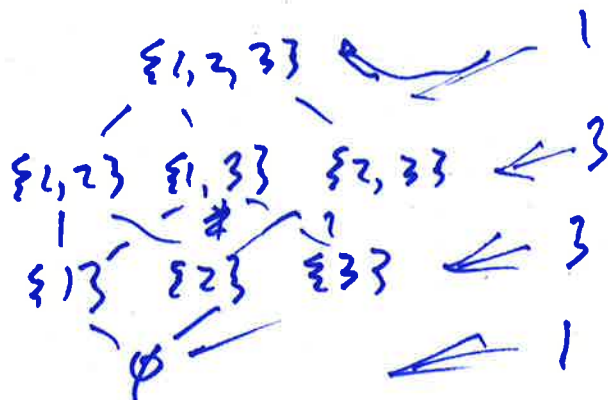
$\emptyset, \{1\}$



$\{1, 2\} :$



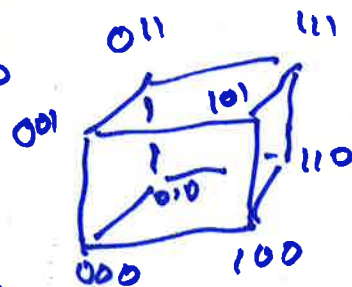
$\{1, 2, 3\} :$



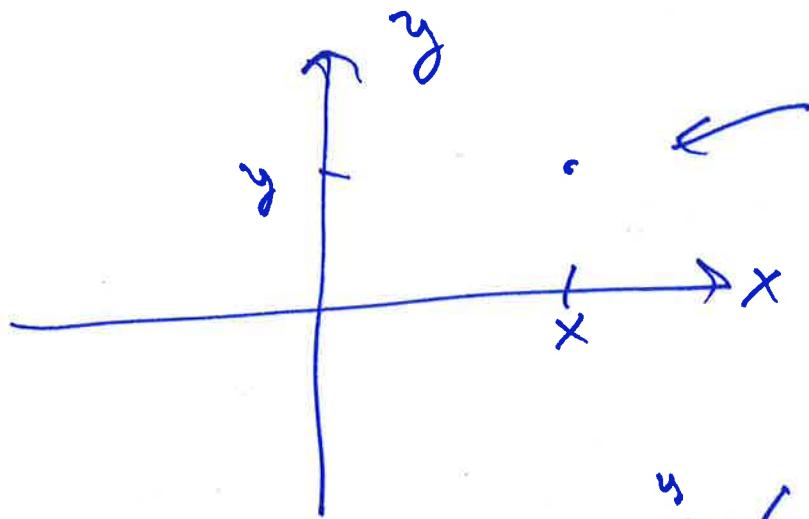
$S,$
 \uparrow
 a set

$\mathcal{P}(S)$

\uparrow
 set of all the
 subsets of S



$$0 \leq x, y, z \leq 1$$



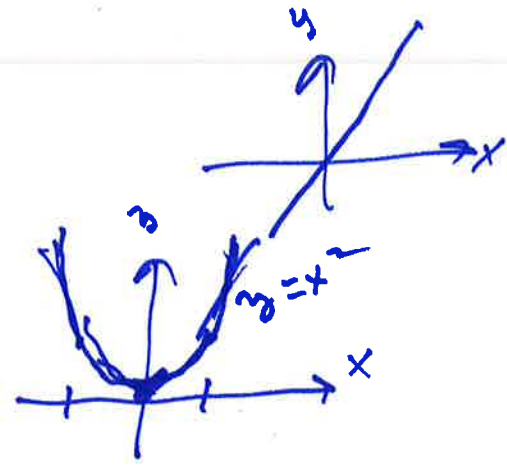
(x, y)
 $\mathbb{R} \times \mathbb{R}$
 $= \mathbb{R}^2$

→

$y = 2x$

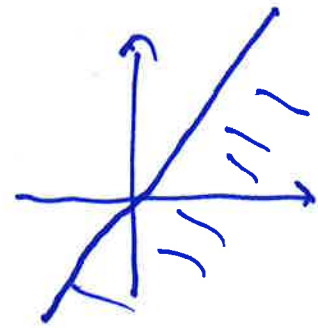
→

$y = x^2$



→

$y = 2x$



↑

↑

Relations on \mathbb{R}

What is a Relation from A to B?

(a subset of $A \times B$)

What is a Relation on A?

(a subset of $A \times A$)

Examples?

"_ father of _"

" $x = y$ "

" $x \leq y$ "

" $x \neq y$ "

means $(x, y) \in \rho$

	1	2	3
1	✓	✓	✓
2	.	✓	✓
3	.	.	✓

$\rho = \{(1, 1), (2, 2), (3, 3)\}$

Some properties that a relation
on a set might have

A relation ρ on A might be:

Symmetric: $\forall x, y \in A$
 $x \rho y \Rightarrow y \rho x.$

reflexive: $\forall x \in A$ $x \rho x.$

transitive: $\forall x, y, z \in A$
 $((x \rho y) \wedge (y \rho z)) \rightarrow (x \rho z).$

antisymmetric: $\forall x, y \in A$
 $(x \rho y) \wedge (y \rho x) \rightarrow (x = y).$

	refl.	symm.	antisym.	trans.
$=$: " $x = y$ "	✓	✓	✓	✓
" x is father of y "	✗	✗	✓	✗
\leq : " $x \leq y$ "	✓	✗	✓	✓
\subseteq : " $x \subseteq y$ "	✓	✗	✓	✓
$<$: " $x < y$ "	✗	✗	✓	✓
∇ : " $x \nabla y$ "	✗	✗	✓	✓

Homework

2.3: the T-F questions and

1, 2, 3, 4 (a, b), 5 (a, d), 6, 7, 9.

2.4: 1, 2, 3, 4, 8, 14, 15.