Engr 123

Reflexive	R	aRa
Symmetric	S	$aRb \rightarrow bRa$
Anti-symmetric	A	$(aRb \wedge bRa) \rightarrow a=b$
Transitive	T	$(aRb \wedge bRc) \rightarrow aRc$

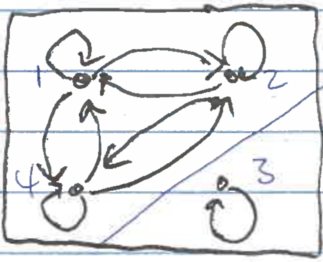
We've seen functions (mappings) already.

Partial Orders & Equivalence relations

Equivalence relation

Reflexive, Symmetry, Transitive

This is the def^n of an equiv rel^n



visual representation (directed graph)

<u>Notation</u>

representative

$$[a]_R = \{ b : aRb \}$$

equivalence classes

$$[1]_R = \{1,2,4\}$$

$$[2]_R = \{1,2,4\}$$

$$[3]_R = \{3\}$$

$$[4]_R = \{1,2,4\}$$

Equivalence classes $\{1,2,4\}$ and $\{3\}$

These equivalence classes have a particular structure.

They partition the set A

A partition on A is defined as a collection of sets satisfying
(1) $\forall a \in A$, a is in one of the sets
(2) No two (different) sets intersect.

~~These~~ These sets are often called cells.

Partial orders

Reflexive, Anti-symmetric, Transitive

Two go-to examples

(1) divisibility (or multiple of) on $\mathbb{N} \setminus \{0\}$

m is a multiple of f

iff

$\exists x \in \mathbb{Z} \, (f \times x = m)$

iff

f is a factor of m

iff

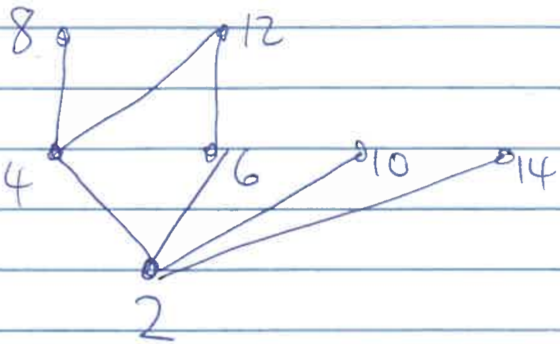
f divides m

iff

m is divisible by f

$A = \{2, 4, 6, 8, 10, 12, 14\}$

aRb iff b is a multiple a



Hasse diagram.
don't include transitive info
or ~~afe~~ reflexive.