Math 322

Syllabus — blackboard.wichita.edu

www.math.wichita.edu/online/

Office Hours — 2-3 T Thr

3-4 T Th (Skype) wsu.arrasmith

Homework — Collected on blackboard

Grades: (+ -)

Review:

321 ① Math (+) language

Logic

"Math"

objects (+) stuff you can do

Rules

3.2.1

objects

propositions

operations

$\wedge, \vee, \neg, \oplus, \leftrightarrow$
$\rightarrow, \forall, \exists$
$=$

sets

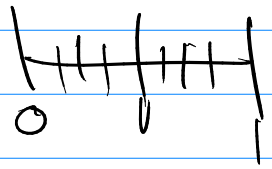
Ex Prove $\mathbb{R}$ is uncountable.

reals

$1 \to 0$
$2 \to 1$
$3 \to -1$
$4 \to 2$
$\vdots$ bijection.

Pf: (contradiction)

assume $\mathbb{R}$ is countable



so reals from 0 to 1 are countable.

$r_1 = 0.d_{11} d_{12} d_{13} \ldots$
$r_2 = 0.d_{21} d_{22} d_{23} \ldots$
$r_3 = 0.d_{31} d_{32} d_{33} \ldots$
$r_4 = 0.d_{41} \ldots$
$\vdots$

Create r^* by $r^* = 0.d_1 d_2 \ldots d_i \ldots$

$d_i \neq d_{ii}$

$d_{11} = 2 \quad d_1 = 3$
$d_{11} \neq 2 \quad d_1 = 2$

$\forall i \; d_i \neq d_{ii}$ $\quad H: r^* \neq r_i$

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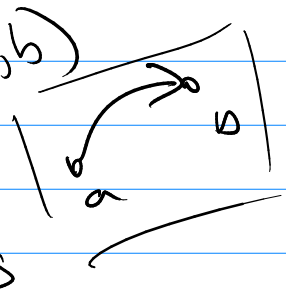
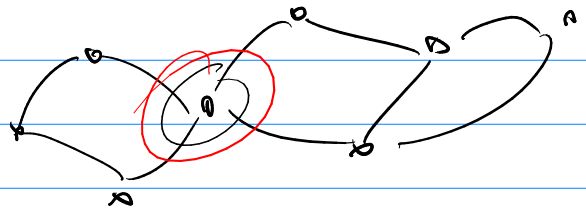
Exam 1 Relations (sets of n-tuples.)



Exam 2 Graph Theory.



Exam 3 Trees. (Boolean Algebra)

Exam 4

human

Math + language = Machines.

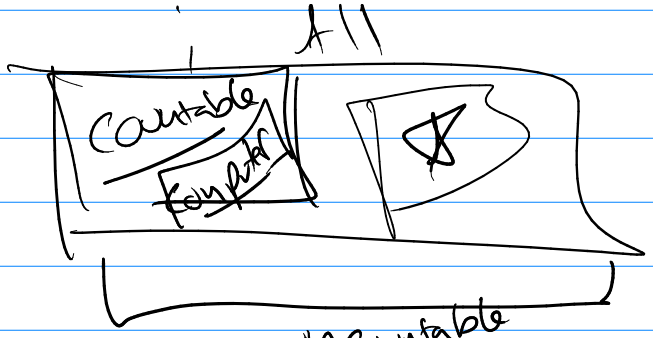
$f(1) = 0$

$r_1 = 0.d_{10}\, d_{11}\, d_{12} \ldots$

$0.d_{20}\, d_{21}\, d_{22} \ldots$

$f_1(i) = d_{1i}$

$f_2(i) = d_{2i}$



8.1 Objects + operations

① n-ary relations, associations

. sets of ordered n-tuples

ex: $A_1, A_2, \ldots, A_n$ are sets.

$$A_1 \times A_2 \times \ldots \times A_n = \{ (a_1, a_2, a_3, \ldots, a_n) \mid a_i \in A_i \}$$

ex $\{a,b,c\} \times \{1,2\}$

$$= \{ (a,1), (a,2), (b,1), (b,2), (c,1), (c,2) \}$$

$$|A_1 \times A_2| = |A_1| |A_2|$$

② $n=2$ binary relation.

or just **Relation**

ex 6-ary relation from

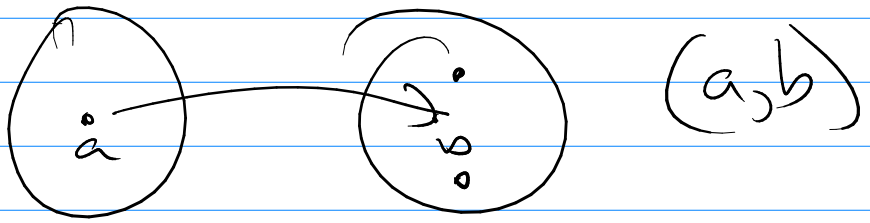
Humans × books × chairs × phones × shoes × glasses

ways to make pairs. easier is to have fewer sets.

ex Humans × books

Humans x books is to hard!

(3) Functions.



Domain

any a in the domain can have only one image b.
all a's in domain must map.

Notation: R, a relation, is a subset of $A \times B$.

if $(a,b) \in R$ same as aRb

$(a,b) \notin R$ same as $a \not R b$

$E = \{ (a,b) \mid aEb \}$

aRa ✓

$aRb \rightarrow bRa$ ✓

$aRb \wedge bRc \rightarrow aRc$ ✓