Recitation

Dec. 2 2014

Chapter 9

9.5

② {(a,b) | a & b are the same age}

ref (a,a)

sym (a,b) (b,a)

trans (a,b) (b,c) → (a,c)

{(a,b) | a,b have same parents}

(a,a)

(a,b) (b,a)

(a,b)(b,c) → (a,c)

{(a,b) | a,b share common parents}

* not transitive

ref : (a,a)

Sym: (a,b)(b,a)

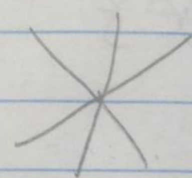
{(a,b) | a,b have met}

* not transitive

9.5-4

$\{(a,b) \mid a \,\&\, b$ are in the same partition$\}$

p_1	p_2
boys	girls



(a,a)
(a,b)(b,a)
(a,b)(b,c)

95.8

$Pow(R) = \{S \mid S \text{ is a subset of } R\}$

$SRT = (S,T) \leftrightarrow |S| = |T|$

$R = \{(S,T) \mid |S| = |T|\}$

$R = \{(S,T) \mid S$ and T have <u>the same</u> cardinality$\}$

proof

$|S| = |S|$

$\forall s \in Pow(R)$

$\rightarrow (S,S) \in R$

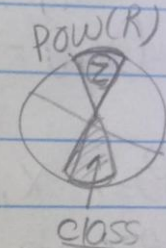
$\rightarrow SRS$

} diff. notations

$R \rightarrow (S,S) \in R$

$S \rightarrow (S,T) \in R \rightarrow (T,S) \in R$

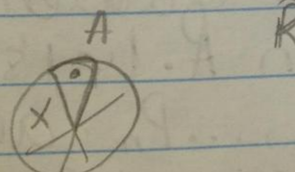
$T \rightarrow (S,T), (T,W) \rightarrow (S,W)$



$[\{0,1,2\}]_R = \{S \mid S \subseteq R \text{ and } |S| = 3\}$

$[Z]_R = \{S \mid S \subseteq R \text{ and } |S| = |Z|\}$

9.5–10.1 -



$\exists f : A \rightarrow$

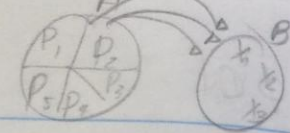
$(x,y) \in R \leftrightarrow f(x) = f(y)$

Solution:

$\exists f : A \to B$

$x \to x_i$

$(x,y) \in R \leftrightarrow f(x) = f(y)$



$\to P_1, P_2, \ldots P_n$

$x_1, x_2, \ldots x_n$

$[x_1] = P_1 \quad [x_2] = P_2$

$B = \{x_1, x_2, \ldots x_n\}$

$(x,y) \in R \to [x] = [y] = P_i$

$f(x) = f(y) = x_i$

for any

$x \in A, \exists P_i : x \in P_i$

Hira solution:

Since R is equivalent, it makes a partition A. Let's say that $P_1, P_2, \ldots P_n$ are the partitions. I define set $B = \{1, 2, \ldots, n\}$

I define function $f : A \to B$

$x \to i$

$x \in P_i$

$(x,y) \in R \to$ x and y belong to the same partition k

$\rightarrow f(x)=K$ and $f(y)=K \rightarrow f(x)=f(y)$

$f(x)=f(y)=K \xrightarrow[\text{of } g]{\text{by def.}} x \in P_K$ and

$y \in P_K$

$\rightarrow (x,y) \in R$

Other exercise: 9.15 - N6

$R = \{(a,b),(c,d)\} \mid ad=bc\}$

equivalence!

① $((a,b),(a,b)) \rightarrow ab=ab$

② $((a,b),(c,d)) \rightarrow ((c,d),(a,b))$

$ad=bc \rightarrow cb=ad$

③ $((a,b)(c,d) \wedge (c,d),(e,f)) \rightarrow ((a,b),(e,f))$

$ad=bc$ $\quad$ $cf=de$ $\quad$ $af=be$

$d=\frac{cf}{e}$

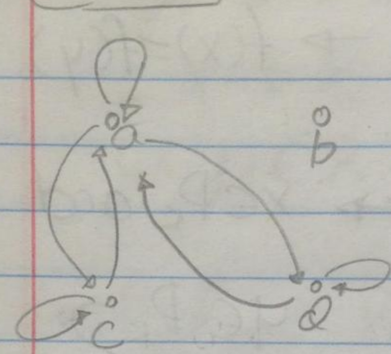
$\frac{acf}{e} = bc$

$af = be$

another way to help: $\{(a,b),(c,d)\} \mid ad=bc$

$\frac{a}{b} = \frac{c}{d}$

9.5 21-23



$\{a, b, c, d\}$

$R = \{(a,d), (d,a), (b,b) \ldots\}$

$(a,c)(a,d) \to (a,d)$ NO! NO relation

$(c,d) \to$ would make it a relation

9.5-36 $[4]_m$

$m = 2$

solution:

$[4]_2 = \{x \mid x = 2k\}$ even

$1 \bmod 2 = 1$ "si no es ewunda a 1"

$2 \bmod 2 = 0$

$3 \bmod 2 = 1$

$4 \bmod 2 = 0$

→ if $m=6$

$[4]_6 = \{x \mid x \bmod 6 = 4\}$

or

$\{x \mid x \bmod 6 = 4 \bmod 6\}$

1 mod 6
2 mod 6
3 mod 6
⋮
4 mod 6

9.5-42

$\{-3, -2, -1, 0, 1, 2, 3\}$

yes. a) $\{-3, -1, 1, 3\}, \{-2, 0, 2\}$

No, BC "0" is repeated b) $\{-3, -2, -1, 0\}, \{0, 1, 2, 3\}$

yes c) $\{-3, 3\}, \{-2, 2\}, \{-1, 1, 0\}$

No, -2 is missing d) $\{-3, 1\}, \{2, 3\}, \{0, -1\}$

yes, has no intersection e) $\{1\}, \{2\}, \{3, -1\}, \{0, -2, -3\}$

ation

4 mod 2 = 0 $= \{\dots -6, -2, 2, 6, 10 \dots\}$,

b) = 3?

$[3] = \{3 + 4c \mid c \in \mathbb{Z}\}$

$= \{\dots -1, 3, 7 \dots\}$

(62) Determine the # of diff. equivalence relations on a set with four elements by listing them.

let set be $\{1, 2, 3, 4\}$

1 partition $\{\{1, 2, 3, 4\}\}$

4 partitions $\{\{1\}, \{2, 3, 4\}\}$, $\{\{1, 3, 4\}, \{2\}\}$ ...

3 partitions of $\{\{1, 2\}, \{3, 4\}\}$, $\{\{1, 4\}, \{3, 2\}\}$, $\{\{1, 3\}, \{2, 4\}\}$

1 partition of all separate → $\{\{1\}, \{2\}, \{3\}, \{4\}\}$

parti of (1,2)(3)(4), (1,3)(2)(4), (1,4)(3)(2), (2,4)(3)(1), (2,3)(1)(4), (2,1),(4),(3), = 15 in total