15.10 IDM-5(P)

BINÁRNA RELÁCIA – ĽUB. PODMNOŽINA USPORIADANÝCH DVOJÍC

$\{1,2,3\ldots,8\} \times \{A,B,C,D\}$

$A \times B$

$R=\{(1,2),(3,4)\}$ $(1,2)\in R$

$A=\{1,2,3,4,5\}$
$B=\{*,\heartsuit,\Delta\}$

$R=\{(1,*),(1,\heartsuit),(2,*),(3,\heartsuit),(4,\heartsuit)\}$

$D(R)=\{1,2,3,4\} \subseteq A$

$H(R)=\{*,\heartsuit\}\subseteq B$

$A=\{\cancel{1}2,3\ldots,9\}$

$B=\{3,4\ldots,10\}$

$R=\{(m,n)\in A\times B;\ m=n+1\}=\{(4,3),(5,4),\ldots,(9,8)\}$

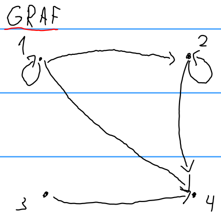
$A=\{1,2,3,4\}$

$R=\{(1,1),(1,2),(1,4),(2,2),(2,4),(3,4)\}$ $R\subseteq A^2$ $A^2=A\times A$

TABUĽKA

R	1	2	3	4
1	1	1	0	1
2	0	1	0	1
3	0	0	0	1
4	0	0	0	0

GRAF



DOPLNKOVÁ RELÁCIA $\overline{R}$

$R=A\times A$
$\overline{R}=(A\times A)\setminus R$

$R=\{(1,1),(2,2),(2,3),(3,1),(3,4)(4,1),(4,2)\}$

$\overline{R}=\{(1,2),(1,3),(1,4),(2,1),(2,4)\ldots\}$

SPÔSOB

$\overline{R}$	1	2	3	4
1	0			
2		0	0	
3	0			0
4	0	0		

DIAGONÁLNA
IDENTICKÁ RELÁCIA Δ_A

$A=\{1,2,3\}$

Δ_A	1	2	3
1	1	0	0
2	0	1	0
3	0	0	1

INVERZNÁ RELÁCIA R^{-1}

$R=\{(1,1),(2,2),(2,3),(3,1),(3,4),(4,1),(4,2)\}$

$R^{-1}=\{(1,1),(2,2),(3,2),(1,3),(4,3),(1,4),(2,4)\}$

$(R^{-1})^{-1}=R$

SKLADANIE RELÁCIÍ

b - lepidlo

$R \circ S = \{[a,c];\ \exists b\ [a,b] \in S \wedge [b,c] \in R\}$ - zložená relácia z R a S

$R = \{(1,*), (1,\heartsuit), (2,\heartsuit), (3,*)\}$

$S = \{(*,1), (*,2), (*,3), (\heartsuit,2)\}$

1: lepidlo, $\Rightarrow (*,*)$

Lepíme odzadu

PLATÍ:

$(R \circ S) \circ T = R \circ (S \circ T)$

$(R \circ S)^{-1} = S^{-1} \circ R^{-1}$

$R \circ S = \{(*,*), (*,\heartsuit), (\heartsuit,\heartsuit)\}$

$S \circ R = \{(1,1), (1,2), (1,3), (2,2), (3,1), (3,2), (3,3)\}$

2. SPÔSOB:

$R \circ S$

$s \xrightarrow{S} \sqrt{s} \xrightarrow{R} \sqrt{s} + 1$

$1 \to \sqrt{1} \to \sqrt{1} + 1 = 2 \to (1,2)$

$4 \to \sqrt{4} \to \sqrt{4} + 1 = 3 \to (4,3)$

$9 \to \sqrt{9} \to \sqrt{9} + 1 = 4 \to (9,4)$

$S \circ R$

$r \xrightarrow{R} r+1 \xrightarrow{S} \sqrt{r+1}$

$3 \to 3+1 \to \sqrt{3+1} = 2 \to (3,2)$

$8 \to 8+1 \to \sqrt{8+1} = 3 \to (8,3)$

DÔKAZ

$(R \circ S)^{-1} = S^{-1} \circ R^{-1} \Leftrightarrow \underset{①}{(R \circ S)^{-1} \subseteq S^{-1} \circ R^{-1}} \wedge \underset{②}{S^{-1} \circ R^{-1} \subseteq (R \circ S)^{-1}}$

①

$(x,y) \in (R \circ S)^{-1} \Rightarrow (y,x) \in R \circ S \Rightarrow \exists z: (y,z) \in S \wedge (z,x) \in R \Rightarrow \exists z: (z,y) \in S^{-1} \wedge (x,z) \in R^{-1} \Rightarrow$

$\Rightarrow \exists z: (x,z) \in R^{-1} \wedge (z,y) \in S^{-1} \Rightarrow (x,y) \in S^{-1} \circ R^{-1}$

②

1. OPAČNE