$\forall x\, P(x) \wedge \forall x\, Q(x) \sim$

$\boxed{\forall x\, (P(x) \wedge Q(x))}$

$\forall x\, P(x) \wedge \forall y\, Q(y) \sim$

$\forall x\, (P(x) \wedge \forall y\, Q(y)) \sim$

$\boxed{\forall x \forall y\, (P(x) \wedge Q(y))}$

Par enakovrednih izjavnih formul (v preneksni obliki) z različnim številom kvantifikatorjev.

$\mathcal{I}$ tipično množica $\mathbb{N}$, $\mathbb{Z}$

$$\mathcal{A} = \{\{1,2,3\}, \{1,3,5\}, \{4,6,1\}\} = \{A_1, A_2, A_3\}$$

$$\bigcup \mathcal{A} = \bigcup_{i=1}^{3} A_i = \{1,2,3,2,3,5,4,6,1\} = \{1,2,3,4,5,6\}$$

$$\parallel$$

$$\bigcup_{i \in \{1,2,3\}} A_i$$

$$\bigcap \mathcal{A} = \bigcap_{i=1}^{3} A_i = \emptyset$$

$$\bigcap_{i=1}^{3} A_i = \{1\}$$

Medklic: $\{a\}$ ..... singleton a

$\{a,b\}$ ..... par a,b

Intervali na $\mathbb{R}$.

$$[a,b] = \{x \in \mathbb{R},\ a \leq x \leq b\}$$
$$(a,b) = \{x \in \mathbb{R},\ a < x < b\}$$
$$(a,b] = \{x \in \mathbb{R},\ a < x \leq b\}$$
$$(a,\infty) = \{x \in \mathbb{R},\ a < x\}$$
$$(-\infty,b] = \{x \in \mathbb{R},\ x \leq b\}$$

Zgledi družin:

(1)
$$\bigcup_{i \in \mathbb{Z}} [i,i+1] = \mathbb{R}$$
$$\bigcap_{i \in \mathbb{Z}} [i,i+1] = \emptyset$$

Družina intervalov $\{[i,i+1],\ i \in \mathbb{Z}\}$ je pokritje $\mathbb{R}$, ni pa razbitje — $1 \in [1,2] \cap [0,1]$

(2)
$$\bigcup_{i \in \mathbb{Z}} [i,i+1) = \mathbb{R}$$
$$\bigcap_{i \in \mathbb{Z}} [i,i+1) = \emptyset$$

Družina intervalov $\{[i,i+1),\ i \in \mathbb{Z}\}$ je razbitje $\mathbb{R}$.

(3)
$$\bigcup_{i \in \mathbb{N}} (i,\infty) = (0,\infty)$$

$B_i = (i,\infty)$

$B_0 \supseteq B_1 \supseteq B_2 \supseteq B_3 \supseteq \ldots$

$\bigcup_{i \in \mathbb{N}} B_i = B_0$

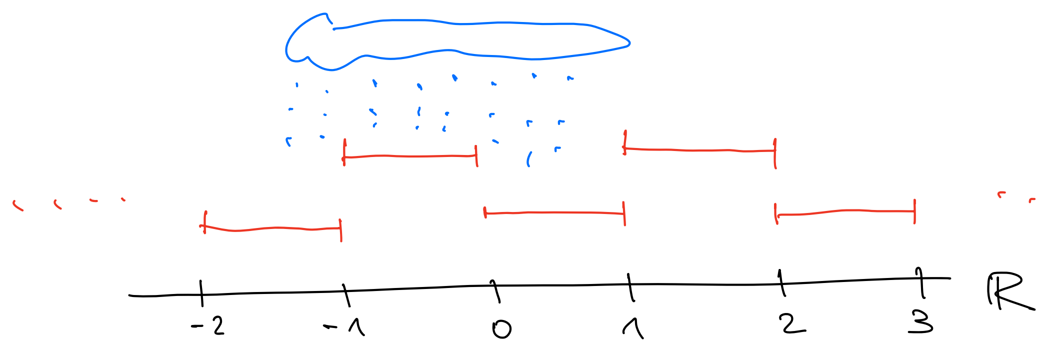
$$\bigcap_{i \in \mathbb{N}} (i,\infty) = \emptyset$$

(4)
$$\bigcup_{i \in \mathbb{N}} (2^{-i},\infty) = (0,\infty)$$

$C_i = (2^{-i},\infty)$

$C_0 \subseteq C_1 \subseteq C_2 \subseteq \ldots$

$$\bigcap_{i \in \mathbb{N}} (2^{-i},\infty) = (1,\infty)$$



par je množica z dvema elementoma
$\{a, b\}$

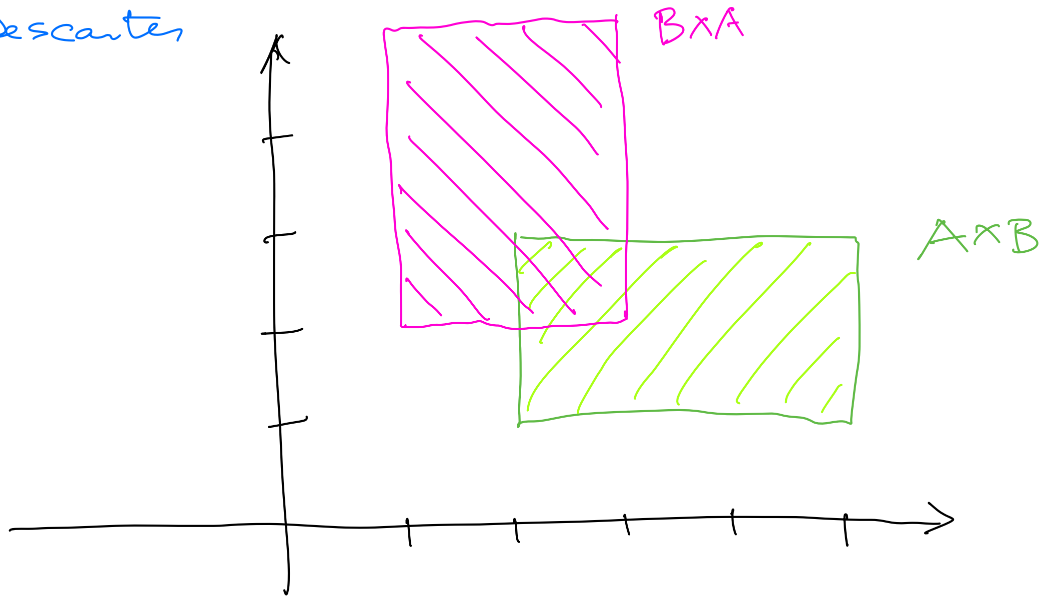
(a, b) urejen par
(a, a)

Kaj bi trditev v resnici pomenila?

$\{\{a\}, \{a, b\}\} = \{\{c\}, \{c, d\}\}$ natanko tedaj, ko

$a = c$ in $b = d$.

Descartes



$A = [2, 5]$
$B = [1, 3]$

$A \times B \neq B \times A$

$A \times B \times C$

$$(A \times B) \times C = A \times (B \times C)$$

kartezični produkt je asociativen

$A^3 = A \times A \times A$ .... množica urejenih trojk s koordinatami iz A

$\equiv$ množica zaporedij dolžine 3 s členi iz A

Ali morda (1) in (2) veljata tudi za presek? DA

Ali morda (3) velja tudi za unijo? NE

→ Pokaži, da velja enakost

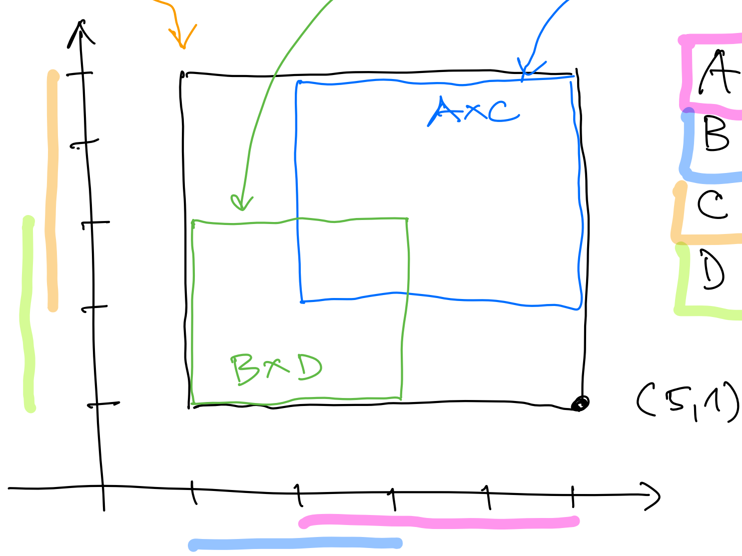
$$(A \cap B) \times C = (A \times C) \cap (B \times C)$$

$$(A \cap B) \times C = (A \cap B) \times (C \cap C) =$$
$$= (A \times C) \cap (B \times C)$$

→ Pokaži, da v splošnem množici

$(5,1) \in (A \cup B) \times (C \cup D)$ in $(A \times C) \cup (B \times D) \not\ni (5,1)$

nista enaki.



$A = [2,5]$

$B = [1,3]$

$C = [2,5]$

$D = [1,3]$

Toda, če $A \times B \subseteq C \times D$, od tod

ne sledi nujno, da $A \subseteq C$ in $B \subseteq D$.

$A = \emptyset$

$C = \{a, b\}$

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

$B = \{a, b, c, 1, 2, 3, 4\}$

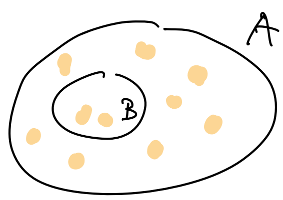
Kdaj je množica končna,

kdaj je neskončna?

$\{\{0,1\}\}$ je singleton $\{0,1\}$

$|\{\mathbb{N}\}| = 1$

$|A \setminus B|$



če je $B \subseteq A$

$|A \setminus B| = |A| - |B|$

$A \setminus B = A \setminus (A \cap B)$

$A \setminus B = A \cap B^c$

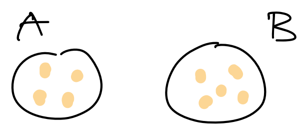
$A \setminus (A \cap B) = A \cap (A \cap B)^c = A \cap (A^c \cup B^c) = (A \cap A^c) \cup (A \cap B^c)$

$= A \cap B^c$

$$|A\setminus B| = |A\setminus(A\cap B)| = |A| - |A\cap B|$$

in $A\cap B \subseteq A$ $\square$

$|A\cup B|$



Če $A\cap B=\emptyset$, potem je

$$|A\cup B| = |A| + |B|$$

$$A\cup B = (A\setminus B)\cup B$$

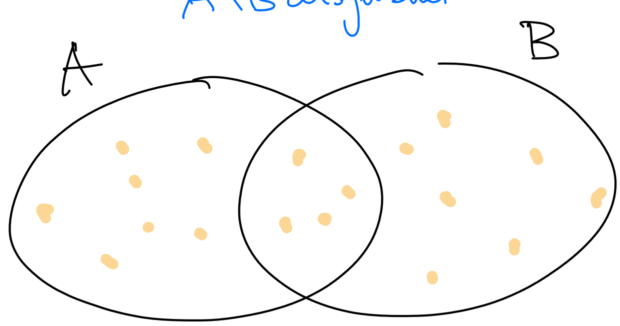
$$(A\setminus B)\cup B = (A\cap B^c)\cup B =$$

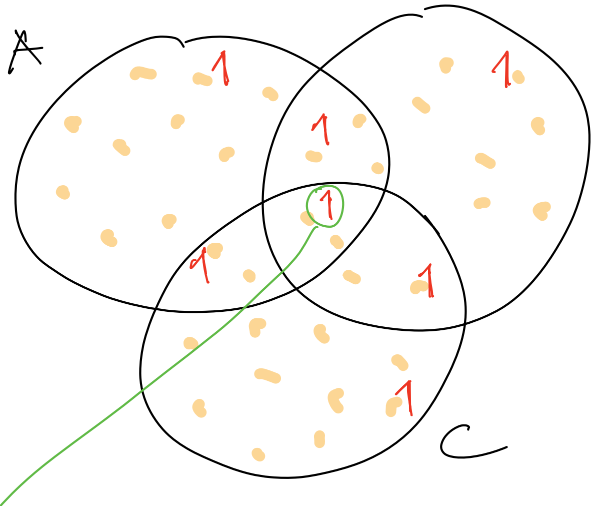
$$= (A\cup B)\cap(\cancel{B^c\cup B}) = (A\cup B)\cap S = A\cup B$$

S univerzalna množica

$$|A\cup B| = |(A\setminus B)\cup B| = |A\setminus B| + |B| = |A| - |A\cap B| + |B|$$

ker sta B in $A\setminus B$ disjunktni



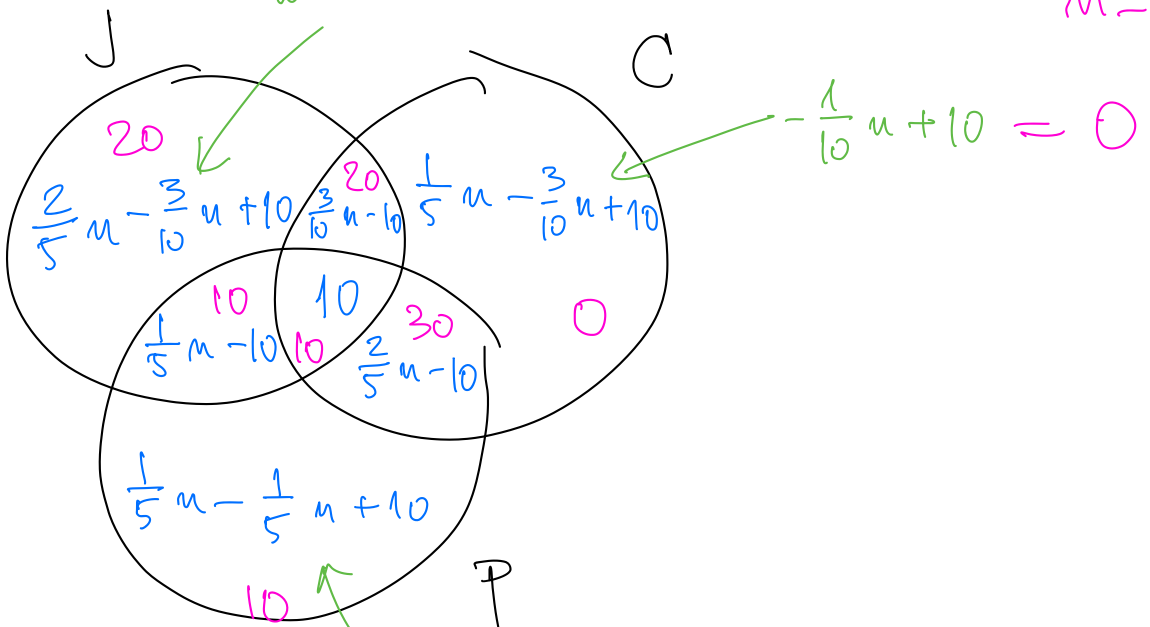


Prispevki (končni) posameznih elementov unije glede na vsebovanost v katerem od območij diagrama.

$1+1+1+(-1)+(-1)+(-1)+1$

$\left.\begin{matrix} J \\ C \\ P \end{matrix}\right\}$ množice programerjev v $\left\{\begin{matrix} \text{Java} \\ \text{C} \\ \text{Python} \end{matrix}\right.$.

$m = 100$



$$|J \cup C \cup P| = n$$

$$n = 10 + \left(\frac{1}{5}n - 10\right) + \left(\frac{2}{5}n - 10\right) + 10 + \left(\frac{1}{10}n + 10\right) + \left(\frac{3}{10}n - 10\right) + \left(-\frac{1}{10}n + 10\right) =$$

$= 10 \quad + n\left(\frac{1}{5}+\frac{2}{5}+\frac{1}{10}+\frac{3}{10}-\frac{1}{10}\right)=$

$= 10 + \frac{9}{10}n$

$10n = 100 - 9n$

$n = 100$

Relacija R je množica urejenih parov.

Relacija R v množici A je

$R \subseteq A \times A$

---

1) $R = \{(e,f),(f,g),(g,h)\}$

$(e,f) \in R \quad \ldots\ldots \quad eRf$

e je v relaciji R z f.

$\mathcal{D}_R = \{e,f,g\}$

$Z_R = \{f,g,h\}$

2) $\mathbb{N}$ $\quad \leq = \{(0,1),(0,0),(0,2),\ldots,$
$(1,1),(1,2),(1,3),\ldots,$
$(2,2),(2,3),(2,4),\ldots,$
$\ldots\ \} \subseteq \mathbb{N}\times\mathbb{N}$

/

relacija "manjše ali enako" v množici $\mathbb{N}$

$(1,3) \in \leq$ ...... $1 \leq 3$

$$\leq \; = \{(x,y),\ x,y \in \mathbb{N} \text{ in } \exists z \in \mathbb{N}\ \ y = x+z\}$$

	REFL	SIM	ANTI.	TRAN	SOV	ENO
id v A	✓	✓	✓			
$\leq$ v $\mathbb{N}$	✓	✗	✓			
$<$ v $\mathbb{N}$	✗	✗	✓*			
$\subseteq$ v PA	✓	✗	✓			
"oče" ljudje	✗	✗	✓*			

x "oče" y ... x je oče od y-ona