

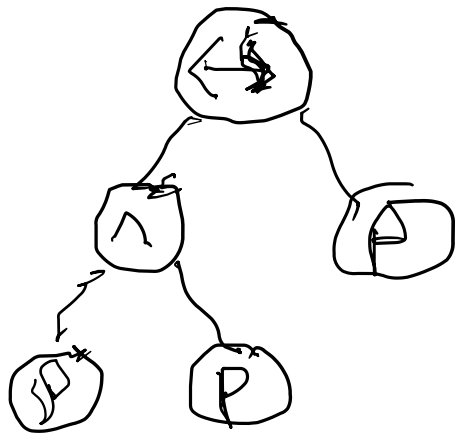
TERMINOLOGJA:

$$\mathcal{K} \models \varphi \equiv \text{val}(\varphi, \mathcal{K}) = 1$$

Tautologija:

1. $\models (\neg\neg P \leftrightarrow P)$ završna pojava, negacija

2. $\models ((P \wedge P) \leftrightarrow P)$ $\models ((P \vee P) \leftrightarrow P)$



P	$P \wedge P$	P	$P \wedge P \leftrightarrow P$
0	0	0	1
1	1	1	1

$$3. \models (p \wedge q) \leftrightarrow (q \wedge p) \quad \models (p \vee q) \leftrightarrow (q \vee p)$$

Komutacyjność

$$4. \models ((p \wedge q) \wedge r) \leftrightarrow (p \wedge (q \wedge r)) \quad , \dots$$

Łączność

Zadanie

$$p \wedge (q \wedge (r \wedge s)) \leftrightarrow (p \wedge q) \wedge (r \wedge s)$$

$$\leftrightarrow ((p \wedge q) \wedge r) \wedge s$$

~~$p \wedge q \wedge r \wedge s$~~
 a ile jest
 liczone

046RE5A

$$3 + 333 + 0.003 + 10^5 =$$

$$0.003 + 3 + 333 + 10^6$$

$$\vdash \neg p \vee p$$

$$\vdash \neg (p \wedge \neg p)$$

prawo wył. i niedla

oznacza. $\varphi \equiv \psi$ ~~iff~~ iff $\vdash (\varphi \leftrightarrow \psi)$

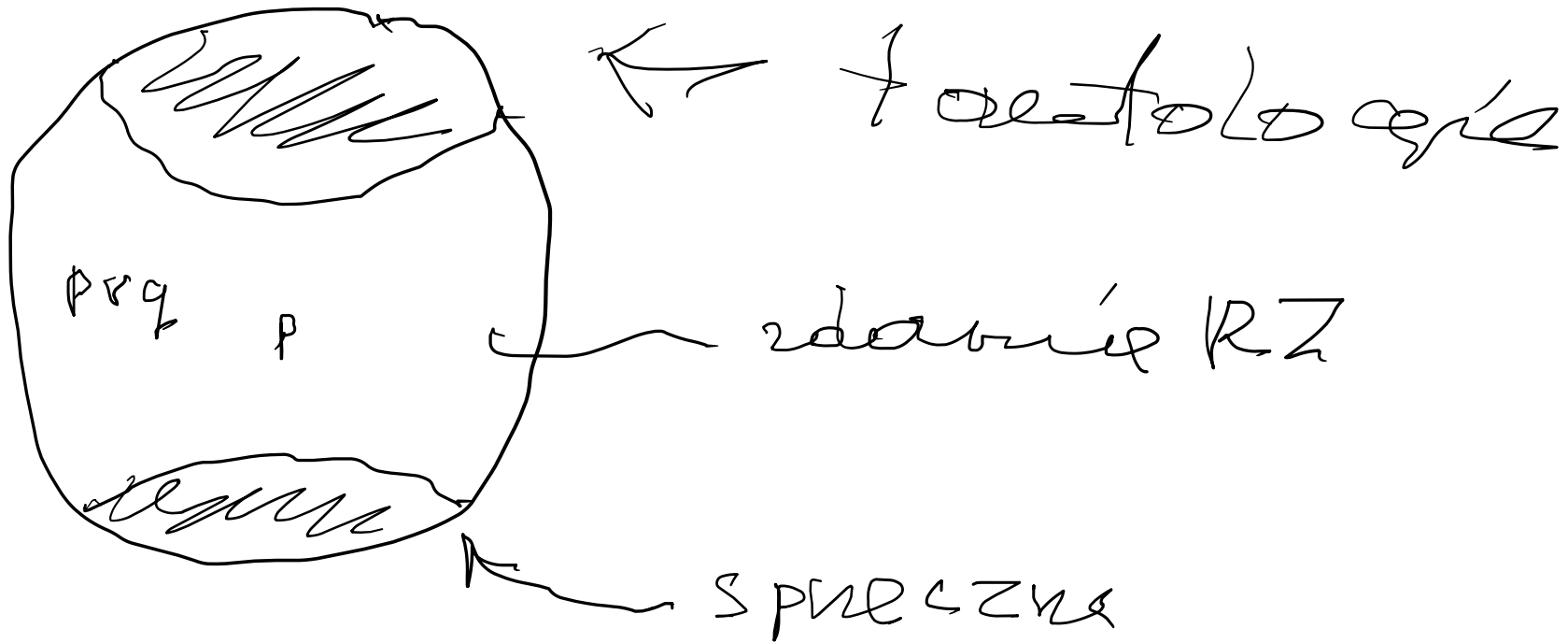
$$\vdash (\neg p \vee p) \equiv \top$$

$$\vdash p \wedge \neg p \equiv \perp$$

wzrostek : $(\vdash \varphi) \iff \varphi \equiv \top$

zdemie sprzeczne : $\varphi \equiv \perp$

taut : $\varphi \equiv \top$



$$\left. \begin{aligned} 6. \neg(p \vee q) &\equiv \neg p \wedge \neg q \\ \neg(p \wedge q) &\equiv \neg p \vee \neg q \end{aligned} \right\} \text{prawo de Morgan}$$

$$\textcircled{P} \quad \neg(\neg p \wedge \neg q) \equiv \neg \neg p \vee \neg \neg q \equiv p \vee q$$

$$7. (p \rightarrow q) \equiv (\neg p \vee q)$$

prawo elementarnej implikacji

Kiedy $p \rightarrow q$ jest fałsz. $\pi(p) = 1, \pi(q) = 0$

Kiedy $\exists p \vee q$ jest fałsz.

o implikacji



$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$	$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$	p i q prawdziwe o wadze 4 kg
$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$	$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$	jeśli p i q prawdziwe \Rightarrow wybierz
FALS. \equiv	$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$	$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$
$p \wedge q$	$p = 1$ $q = 0$	$\begin{matrix} \text{p} \\ \text{q} \end{matrix}$

$$\text{val}(\neg p, \pi) = \text{val}(q, \pi) = 0$$

||

$$\neg \text{val}(p, \pi)$$

$$\begin{matrix} 0 & 1 \\ 2 & 2 \end{matrix} \pi(q) = 0$$

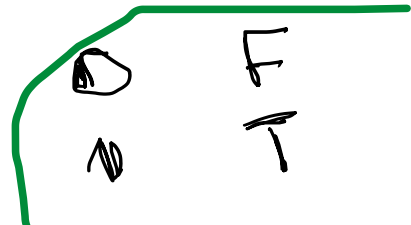
$$\pi(p) = 1$$

$$(p \leftrightarrow q) \equiv (p \rightarrow q) \wedge (q \rightarrow p)$$



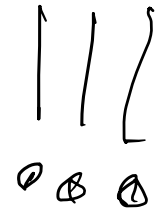
$$\begin{matrix} \neg & \dots & \&\& \\ \neg & \dots & || \end{matrix}$$

$$\neg \dots$$



$$\vdash (p \wedge \neg p) \rightarrow q$$

$$\vdash \perp \rightarrow q$$



INNIE SPÓJNIKI LOGICZNE

• ~~kreska~~ ~~Schlegel~~ ~~Pierce'a~~

spójnik Pierce'a

$$p \uparrow q \stackrel{\text{def}}{\equiv} \neg p \wedge \neg q$$

$$p \uparrow p \equiv \neg p \wedge \neg p \equiv \neg p$$

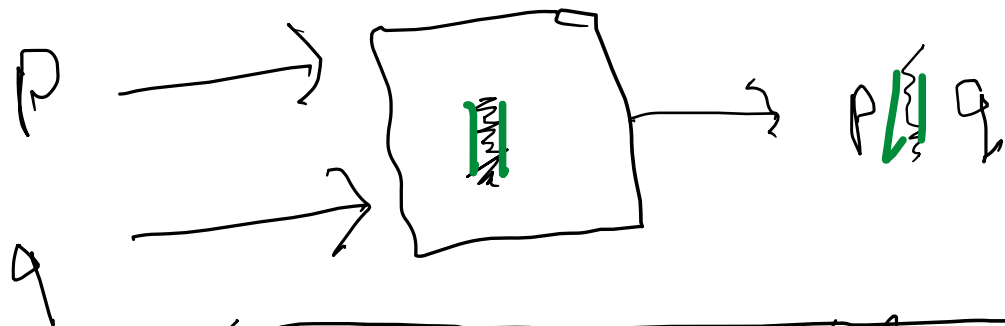
$$\begin{aligned} (p \uparrow p) \uparrow (q \uparrow q) &\stackrel{\text{def}}{\equiv} (\neg p) \uparrow (\neg q) \equiv \neg \neg p \wedge \neg \neg q \\ &\equiv p \wedge q \end{aligned}$$

••• zadanie

KIESKA

~~spójnik Perce'a; Schepera~~

$$P \downarrow Q \equiv \exists P \vee \exists Q$$



SPÓJNIK XOR: alternatywa wykluczająca

$$P \oplus Q \equiv (P \wedge \neg Q) \vee (\neg P \wedge Q) \quad \boxed{\text{albo}}$$

$$\text{val}(P \oplus Q, \pi) = 1 \equiv \underbrace{(\pi(P) = 1 \wedge \pi(Q) = 0) \text{ lub } (\pi(P) = 0 \wedge \pi(Q) = 1)}$$

$$\pi: P \rightsquigarrow 1, Q \rightsquigarrow 0 \quad \text{val}(P \oplus Q, \pi) = 0 \quad \text{[... lub / albo ...]}$$

$$\begin{aligned}
 1. \quad p \oplus \perp &\equiv (p \wedge \perp) \vee (\neg p \wedge \perp) \\
 &\equiv (p \wedge \perp) \vee (\neg p \wedge \perp) \equiv p \vee \perp \\
 &\equiv p \\
 2. \quad p \oplus \top &\equiv (p \wedge \top) \vee (\neg p \wedge \top) \equiv p \\
 3. \quad p \oplus p &\equiv (p \wedge p) \vee (\neg p \wedge p) \equiv \perp \\
 4. \quad \oplus \text{ ist kommutativ} \quad \{ \}
 \end{aligned}$$

6. Mose K

$$(p \oplus q) \oplus q \equiv p \oplus (q \oplus q) \equiv p \oplus \perp \equiv p$$



$K \approx$ "jutro waga" 4

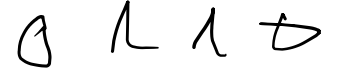
$K \rightarrow$



Alice



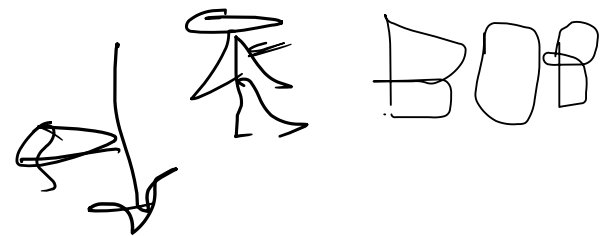
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K

"jutro waga"

