
2-AIN-108 Výpočtová logika: Prvorádová logika

Gentleman punishes or kills everyone who insults a lady.

$$(\forall z)(lady(z) \rightarrow (\forall y)(insult(y, z) \rightarrow (\exists x)(gentleman(x) \wedge (punish(x, y) \vee kill(x, y))))))$$

Whoever insults a lady, is rude.

$$(\forall z)(lady(z) \rightarrow (\forall y)(insult(y, z) \rightarrow rude(y)))$$

Gentleman kills only enemies who attack him.

$$(\forall x)(gentleman(x) \rightarrow (\forall y)(kill(x, y) \rightarrow (enemy(y, x) \wedge attack(y, x))))$$

Gentleman kills all enemies who attack him.

$$(\forall x)(gentleman(x) \rightarrow (\forall y)((enemy(y, x) \wedge attack(y, x)) \rightarrow kill(x, y)))$$

Rude people are gentleman's enemies.

$$(\forall x)(gentleman(x) \rightarrow (\forall y)(rude(y) \rightarrow enemy(y, x)))$$

Peggy Sue is a lady.

$$lady(PeggySue)$$

Billy Boy insulted Peggy Sue.

$$insult(BillyBoy, PeggySue)$$

Jackie is a gentleman.

$$gentleman(Jackie)$$

Billy Boy attacked Jackie.

$$attack(BillyBoy, Jackie)$$

1 Sémantika

1. V tabuľke 1 je zhrnutá syntax a sémantika symbolov, termov a formúl jazyka prvého rádu. Význam ktorých symbolov je rovnaký pre každý jazyk?
2. Nájdite takú interpretáciu, ktorá

- (a) je modelom
- (b) nie je modelom

teórie z úvodu cvičení.

Symbol	Example	Semantics	Type
variable	x	domain value	D
function symbol	f	function	$D^n \mapsto D$
predicate symbol	p	predicate	$D^n \mapsto \{0, 1\}$
logical connective	\rightarrow	boolean function	$\{0, 1\}^n \mapsto \{0, 1\}$
quantifier	\forall	functor	$(D \mapsto \{0, 1\}) \mapsto \{0, 1\}$

Word	Example	Semantics	Type
variable	x	domain value	D
function term	$f(t_1, \dots, t_n)$	domain value	D
atomic formula	$p(t_1, \dots, t_n)$	boolean value	$\{0, 1\}$
propositional formula	$(\phi_1 \rightarrow \phi_2)$	boolean value	$\{0, 1\}$
quantified formula	$(\forall x)\phi$	boolean value	$\{0, 1\}$

Tabuľka 1: Syntax a sémantika jazyka prvého rádu