Formální Metody a Specifikace - Cvičení 1

24. únor 2011

1 První Úkol

Let ϕ be the following formula:

$$\exists x \,.\, P(y,z) \;\wedge\; \forall y \,.\, \neg Q(y,x) \;\vee\; P(y,z)$$

- Draw the syntax tree of ϕ.
- Identify all free and bound occurrences of variables in ϕ.
- Compute $\phi[x \leftarrow w]$, $\phi[y \leftarrow w]$, $\phi[y \leftarrow f(x)]$, $\phi[z \leftarrow g(y,z)]$.
- Draw the syntax tree of $\phi[z \leftarrow 2^u + uv + u!]$.

(4 points)

2 Druhý Úkol

Let A and B be two unary predicate symbols, P, Q, R be predicate symbols of arity 0, and let f be a unary function symbol. Prove

- $[[P \wedge Q] \Rightarrow P] \Leftrightarrow [R \vee \neg R]$
- $[[P \wedge Q] \Rightarrow R] \Leftrightarrow [P \Rightarrow [Q \Rightarrow R]]$
- $[\exists x \,.\, A(f(x)) \Rightarrow B(x)] \Leftrightarrow [[\forall x \,.\, A(f(x))] \Rightarrow [\exists x \,.\, B(x)]]$

(3 points)