Ausgewählte Kapitel der Logik

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Aufgabe 1

a)

$$\begin{aligned}
\varphi_{on}(z, z_1, ..., z_k) :=& z = z_1 + \underline{1} \vee z = z_1 + z_2 + \underline{2} \vee ... \vee z_1 + ... + z_k + k \\
\varphi^M_{start}(x, y, z_1, ..., z_k) :=& \varphi^M_{Konf}(x, y) \wedge \varphi_\beta(x, \underline{0}, \underline{q_0}) \wedge \\
& \forall z < y . \underline{0} < z \rightarrow \\
& (\varphi_{on}(z, z_1, ..., z_k) \rightarrow \varphi(x, z, \underline{2})) \wedge \\
& (\neg\varphi_{on}(z, z_1, ..., z_k) \rightarrow \varphi(x, z, \underline{1}))
\end{aligned}$$

c)

$$\begin{aligned}
\varphi^M_{schritt}(x, y, x', y') :=& \varphi_{Konf}(x, y) \wedge \varphi_{Konf}(x', y') \wedge \\
& \exists z < y \exists w \leq x \exists w' \leq x \exists \alpha \leq x \exists \alpha' \leq x \\
& (\forall z' z \neq z' \wedge z + 1 \neq z' \wedge z \neq z' + 1 \rightarrow \exists b \leq \varphi_\beta(x, z', b) \wedge \varphi_\beta(x', z', b)) \wedge \\
& \bigvee_{\substack{q \in Q, \alpha \in \{\underline{0}, \underline{1}, \underline{2}\} \\ \delta(q, \alpha) = (w', \alpha', p)}} w = q \wedge \varphi_\beta(x, z, w) \wedge \varphi_\beta(x, z + 1, \alpha) \wedge \chi_p(x, x', z, w', \alpha')
\end{aligned}$$

$$\begin{aligned}\chi_{\leftarrow}(x, x', z, w', \alpha') :=& \exists z' < z \wedge z_{-1} + 1 = z \wedge \\ & \varphi_\beta(x', z_{-1}, w') \wedge \\ & \exists l \leq x . \varphi_\beta(x', z, l) \wedge \varphi_\beta(x, z_{-1}, l) \wedge \\ & \varphi_\beta(x', z+1, \alpha')\end{aligned}$$

$$\begin{aligned}\chi_{\downarrow}(x, x', z, w', \alpha') :=& \varphi_\beta(x', z, w') \\ & \varphi_\beta(x', z+1, \alpha')\end{aligned}$$

$$\begin{aligned}\chi_{\rightarrow}(x, x', z, w', \alpha') :=& \varphi_\beta(x', z+1, w') \\ & \varphi_\beta(x', z, \alpha')\end{aligned}$$

Aufgabe 2

Aufgabe 3

Aufgabe 4