

Aufgabe 1

$\phi_1 : true \mathcal{U} \mathcal{X} a$ matches to π_1 .

$\phi_2 : \mathcal{G} \mathcal{X} a$ matches to π_2 .

$\phi_3 : a \mathcal{U} a$ matches to π_3 .

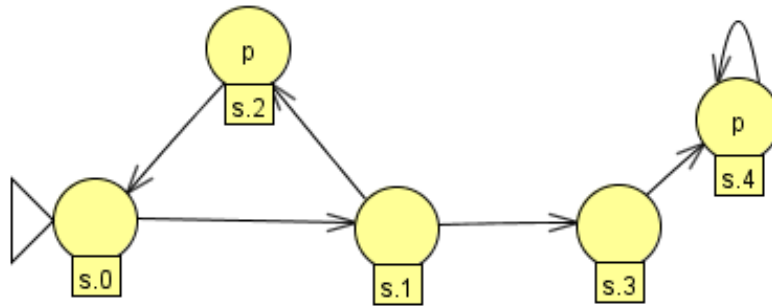
$\phi_4 : a \wedge a$ matches to π_4 .

$\phi_5 : \mathcal{F} \mathcal{G} a$ matches to π_5 .

$\phi_6 : (\mathcal{X} b) \mathcal{U} a$ matches to π_6 .

Aufgabe 2

Counterexample:



While the CTL formulae $AXAFp$ is accepted by the example above. The path $s_0s_1s_3$ however is not accepted by the formula $AFAXp$. Thus $AXAFp$ and $AFAXp$ are not equivalent.

Aufgabe 3

$$\begin{aligned}
 & \forall s_0 : \mathcal{AG}(p \rightarrow \mathcal{AF}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \mathcal{G}(p \rightarrow \mathcal{AF}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \mathcal{G}(\neg p \vee \mathcal{AF}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \neg \mathcal{F}(p \wedge \neg \mathcal{AF}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \neg \mathcal{F}(p \wedge \exists \neg \mathcal{F}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \neg \mathcal{F}(p \wedge \neg \mathcal{F}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \mathcal{G}(\neg p \vee \mathcal{F}q) \\
 \Leftrightarrow & \forall s_0 : \forall \pi = s_0s_1\dots : \mathcal{G}(p \rightarrow \mathcal{F}q)
 \end{aligned}$$