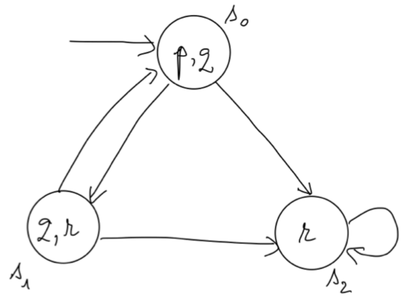
1. Does the labelled transition system $\mathcal{M}$ from below satisfies the specification $\varphi = XGp$? Illustrate all the steps from the model checking algorithm.

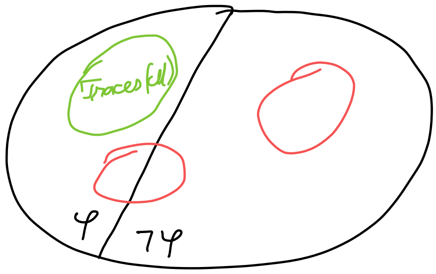
$\mathcal{M} \models \varphi$ dacă pt orice π - execuție în $\mathcal{M}$ din s_0 avem $\pi, 0 \models \varphi$

$\mathcal{M}$:



$$Traces(\mathcal{M}) \subseteq \mathcal{L}(\varphi)$$

$$Traces(\mathcal{M}) \cap \mathcal{L}(\neg\varphi) = \emptyset$$



$(2^{AP})^{\omega}$ - toate cuv inf peste AP

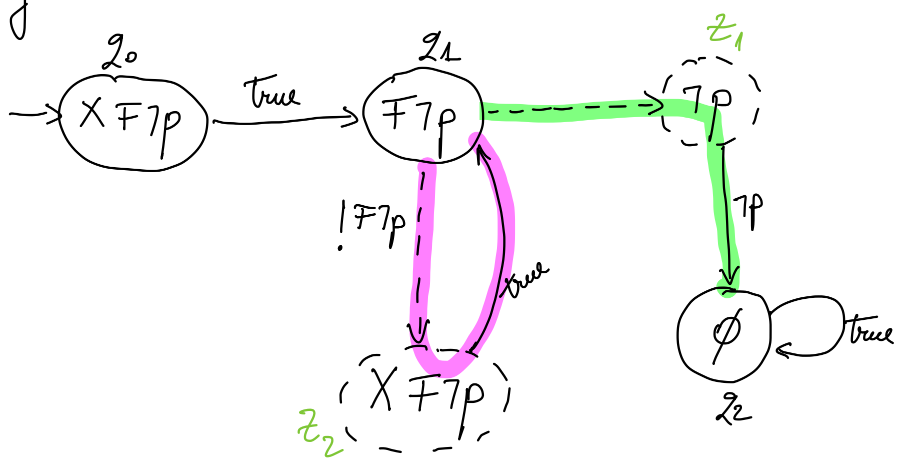
$$\mathcal{L}(\mathcal{A}_{\mathcal{M}} \cap \mathcal{A}_{\neg\varphi}) = \emptyset$$

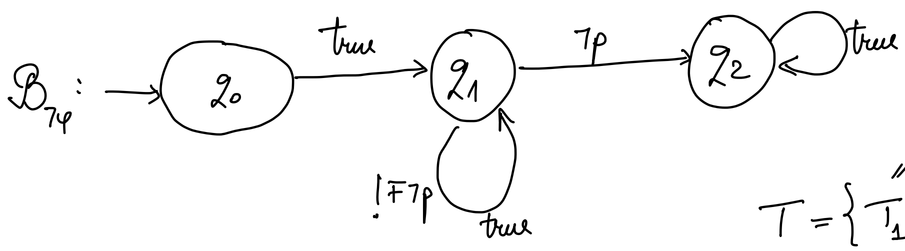
$\boxed{\mathcal{A}_{\neg\varphi}}$: $\neg\varphi = \neg XGp$

1) NNF :

$$\neg\varphi = \neg XGp \equiv X\neg Gp \equiv XF\neg p$$

2) aut generalizat

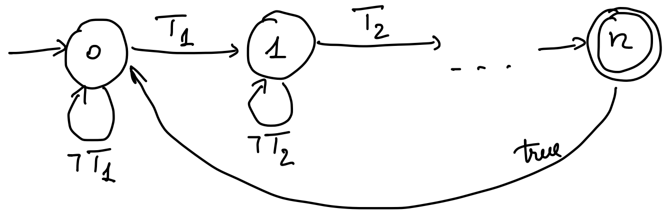




$T_{F\neg p} = \{q_0 \to q_1, q_1 \to q_2, q_2 \to q_2\}$

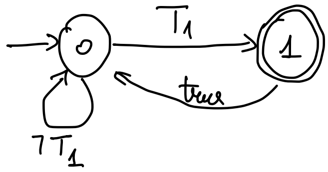
$T = \{ T_1 \}$

$\mathcal{D}_n$

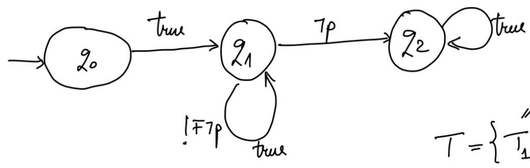


$n=1$

$\mathcal{D}_1$:



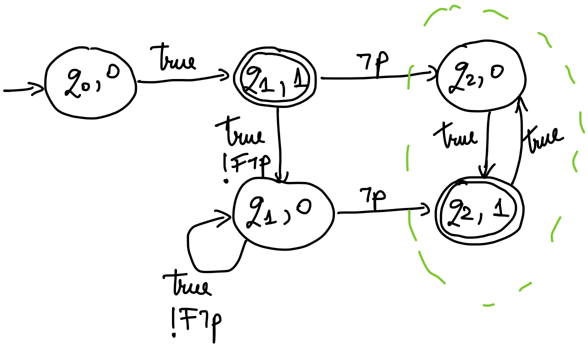
$\mathcal{B}_{\neg\varphi}$:

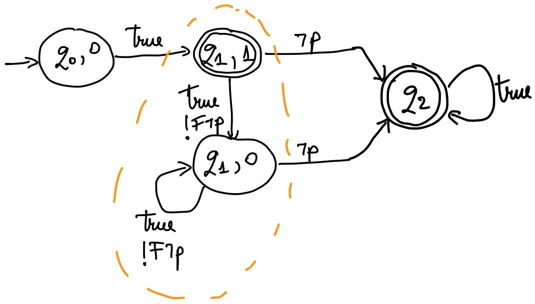


$T_1 = T_{F\neg p} = \{q_0 \to q_1, q_1 \to q_2, q_2 \to q_2\}$

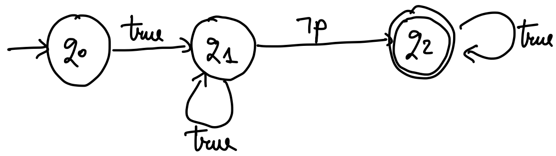
$T = \{T_1\}$?

$\mathcal{B}_{\neg\varphi} \otimes \mathcal{D}_1$



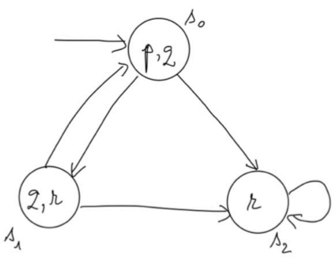


$\mathcal{A}_{\neg\varphi}$:

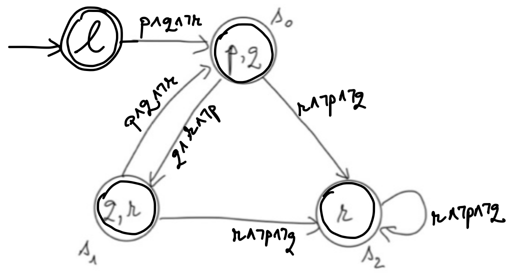


$\boxed{\mathcal{A}_{\mathcal{M}}}$

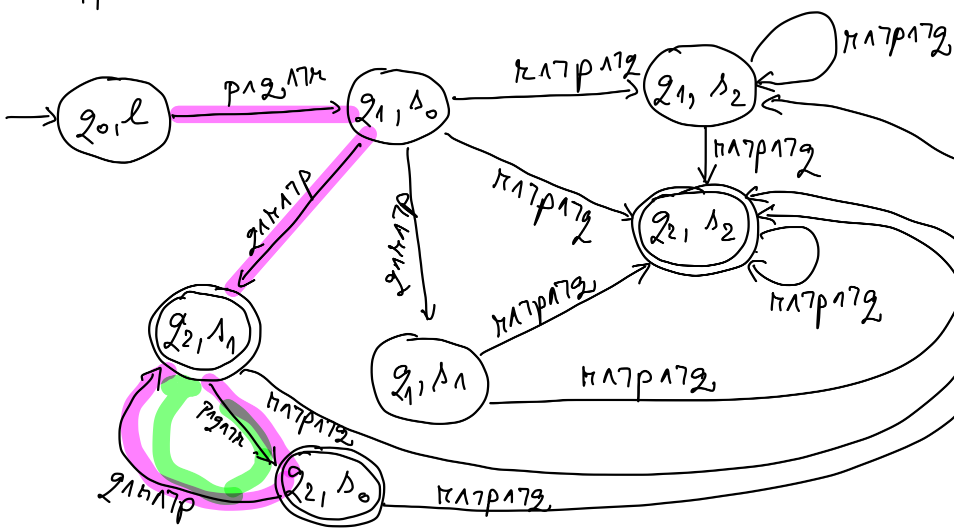
$\mathcal{M}$:



$\mathcal{A}_{\mathcal{M}}$:



$\mathcal{A}_{\mathcal{M}} \cap \mathcal{A}_{\neg\varphi}$:



← Acceptă măcar un cuv. inf ?

DA

$\mathcal{L}(\mathcal{A}_{\mathcal{U}} \cap \mathcal{A}_{\neg\varphi}) \neq \emptyset$

φ

— acceptă $w = \underbrace{\{p,q\}\{q,r\}}_{u}\underbrace{(\{p,q\}\{q,r\})^{\omega}}_{(v)^{\omega}}$

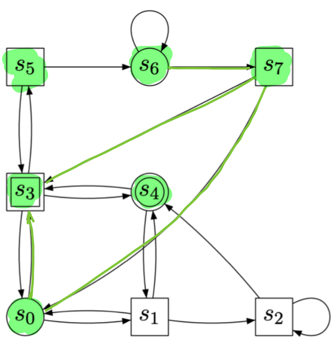
$\pi = s_0(s_1\, s_0)^{\omega}$ — contraexemplu

$\pi, 0 \not\models \varphi$

Aut pt $\varphi = p\, \mathcal{U}\, q$

- φ - în NNF — NU $\neg\varphi$

2. For the arena below, compute the winning region for the player controlling circles when his objective is $Reach(\{s_3, s_4\})$.



Player A : ○ — reach($\{s_3, s_4\}$)

Player B : □

$Attr_0^A(\{s_3, s_4\}) = \{s_3, s_4\}$ — $rank(s_3) = 0 = rank(s_4)$

$Attr_1^A(\{s_3, s_4\}) = \{s_3, s_4, s_0\}$ — $rank(s_0) = 1$

$Attr_2^A(\{s_3, s_4\}) = \{s_3, s_4, s_0, s_7\}$

$Attr_3^A(\{s_3, s_4\}) = \{s_3, s_4, s_0, s_7, s_6\}$

$Attr_4^A(\{s_3, s_4\}) = \{s_3, s_4, s_0, s_7, s_6, s_5\}$

$Attr_5^A(\{s_3, s_4\}) = Attr_4^A(\{s_3, s_4\}) = \underline{Attr^A(\{s_3, s_4\})}$

$= Win_A(\{s_3, s_4\})$

$\sigma_A : V^* V_A \longrightarrow V$

$\sigma_A(\ldots\ldots s_0) = s_3$

$\sigma_A(\ldots\ldots s_4) = s_1$ // sau orice

$\sigma_A(\ldots\ldots s_6) = s_7$

$Win_B(\{s_3, s_4\}) = \{s_1, s_2\}$

Player B poate evita s_3, s_4

$\sigma_B : V^* V_B \to V$

$\sigma_B(\ldots\ldots s_1) = s_2$

$\sigma_B(\ldots\ldots s_2) = s_2$

$\sigma_B(\ldots\ldots s_3) =$ orice