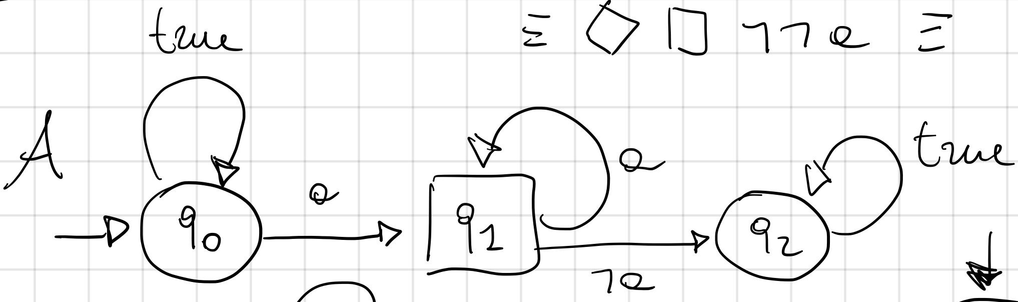
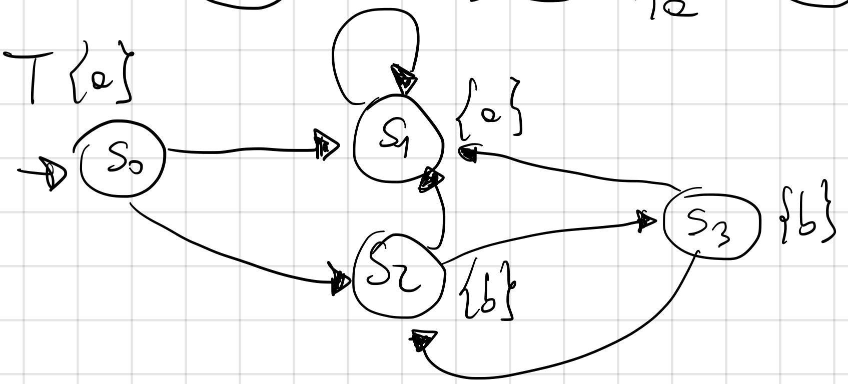
$\boxed{\varphi = \Box\Diamond\neg a}$

$\neg\varphi \equiv \neg\Box\Diamond\neg a \equiv \Diamond\neg\Diamond\neg a$

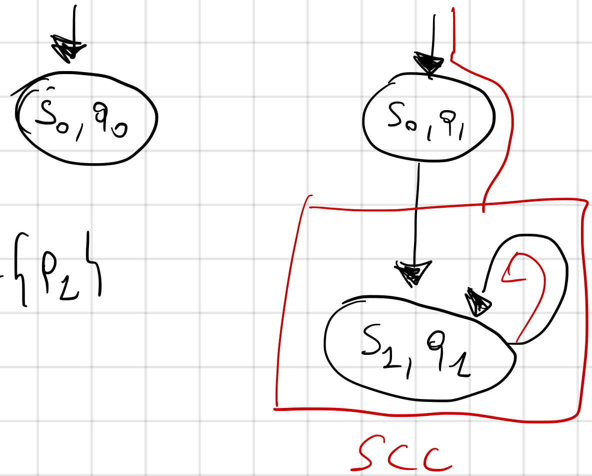
$\equiv \Diamond\Box\neg\neg a \equiv \Diamond\Box a$



$AP = \{a, b\}$



$F = \{q_2\}$



$\delta(q_0, L(s_0)) = \delta(q_0, \{a\}) = \{q_0, q_1\}$

$T \otimes A \not\models \Diamond\Box\neg F$

$s_0 \longrightarrow s_1$:

$\delta(q_1, L(s_1)) = \delta(q_1, \{a\}) = \{q_1\}$

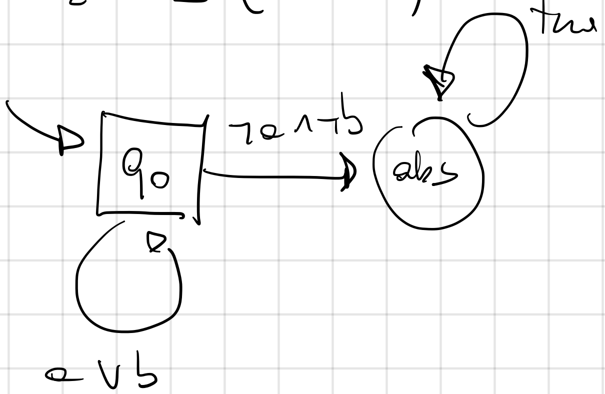
$s_1 \longrightarrow s_1$:

$\delta(q_1, L(s_1)) = \{q_1\}$

Counterexample is the path $\pi : \underbrace{s_0}_{\text{prefix}} \underbrace{s_1}_{\text{cycle}}{}^{\omega}$

We conclude $T \not\models \varphi$

$\varphi_2 = \Box(a \vee b)$



$\varphi_2 = (\Box a) \vee (\Box b)$