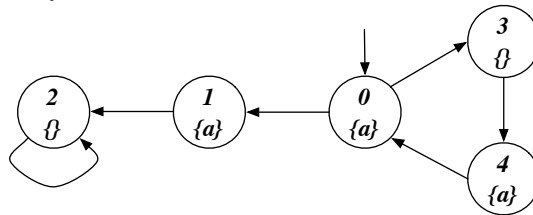
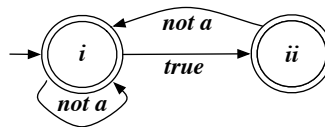


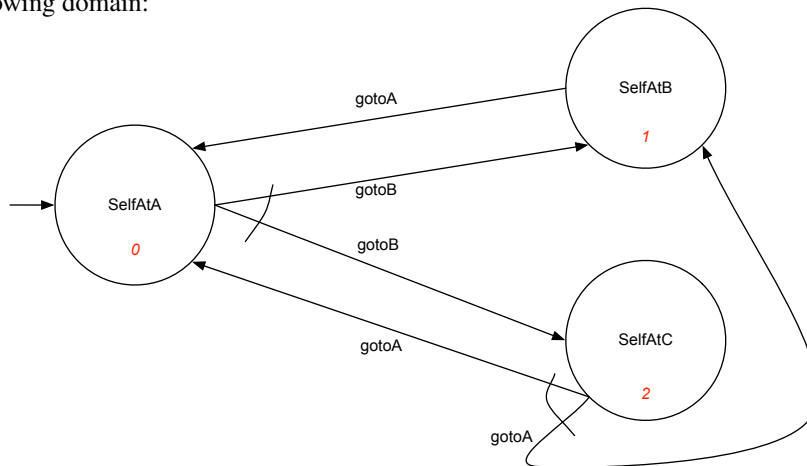
Part 1. Consider the following transition system:



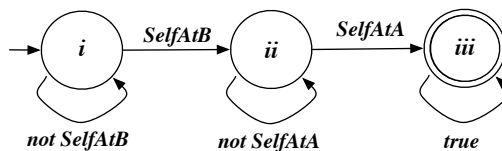
- **Exercise 1.1:** Model check the Mu-Calculus formula: $\nu X.\mu Y.((a \wedge \langle next \rangle X) \vee \langle next \rangle Y)$
- **Exercise 1.2:** Model check the CTL formula $AF(a \wedge AXa)$, by translating it in Mu-Calculus.
- **Exercise 1.3:** Model check the LTL formula $\diamond(a \wedge \bigcirc a)$, by considering that the Büchi automaton for $\neg\diamond(a \wedge \bigcirc a)$ is the one below:



Part 2 Consider the following domain:



- **Exercise 2.1:** Synthesize a strategy (a plan) for realizing the LTLf formula $\diamond(\text{SelfAtB} \wedge \diamond(\text{SelfAtA}))$, by considering that the corresponding DFA is the one below:



Part 3 Consider the notion of invariant of a while-loop.

- **Exercise 3.1:** Check whether the following Hoare triple is correct, using as invariant $i \leq 10$.

$\{i = 0\}$ while $(i < 10)$ do $(tmp := i; tmp := tmp + 1; i := tmp)$ $\{i = 10\}$