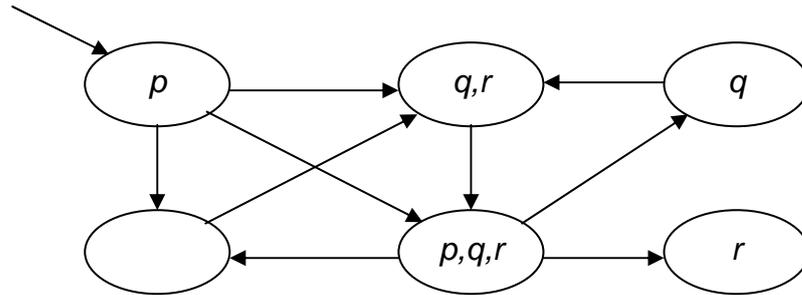


Exercise 2: Symbolic safety analysis and liveness analysis

1. We have the following Kripke structure M with proposition set $\{p, q, r\}$. We only put down the proposition names that are true at states.



Please construct a propositional logic formula that describes the states of M .

2. For the Kripke structure M in question 1, please construct a propositional logic formula of variables $\{p, q, r, p', q', r'\}$ that describes the transition relation of M .

3. For the Kripke structure M in question 1, please use the symbolic least fixpoint algorithm to construct a propositional formula that characterizes states satisfying $\exists \diamond q$. According to the formula you constructed, please tell me whether the initial state satisfies $\exists \diamond q$?

4. For the Kripke structure M in question 1, please use the symbolic least fixpoint algorithm to construct a propositional formula that characterizes states satisfying $\exists \square (q \vee r)$. According to the formula you constructed, please tell me whether the initial state satisfies $\forall \diamond ((\neg q) \wedge \neg r)$?