

## Theoretical Foundations of the UML SS 2016

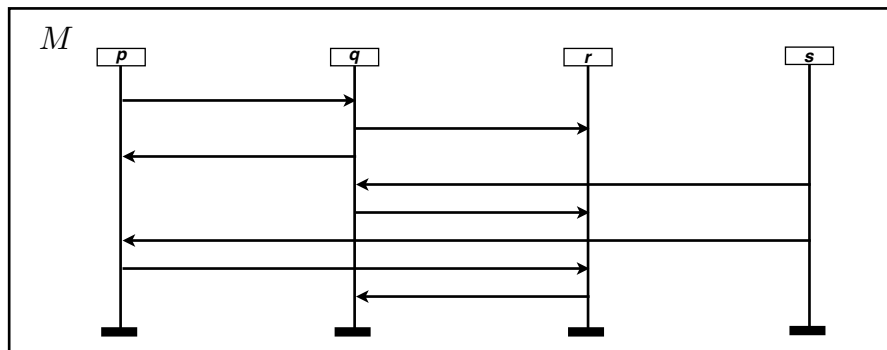
### — Series 2 —

Hand in until May 12 before the exercise class

#### Exercise 1 (Races in MSC)

(2 Points)

Consider the MSC  $M$ :

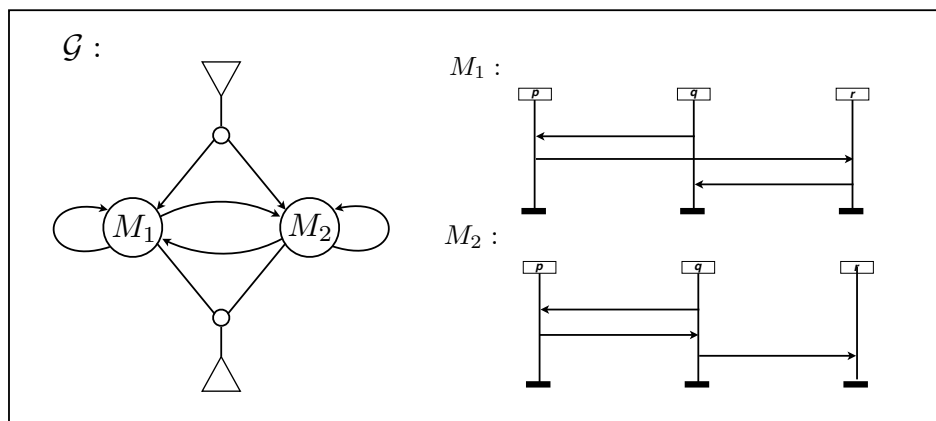


- Draw the Hasse diagram of  $M$ .
- Determine all races in the MSC  $M$  and justify your answer (e.g., by means of another Hasse diagram for  $\ll$ ).

#### Exercise 2 (MSG)

(3 Points)

Consider the MSG  $\mathcal{G}$ :





- a) Give 3 different accepting paths of the MSG  $\mathcal{G}$  and the MSC language  $L(\mathcal{G})$ .
- b) Determine the word language  $Lin(L(\mathcal{G}))$  of MSG  $\mathcal{G}$ .
- c) Determine the races in the MSG  $\mathcal{G}$  and justify your answer.

**Exercise 3 (Finite state automata & MSG)**

(5 Points)

Given a finite-state automaton  $P$  and an *MSG* graph  $G$ , let  $\mathcal{L}(P)$  and  $\mathcal{L}(G)$  be the languages of  $P$  and  $G$ , respectively. (Hence,  $\mathcal{L}(P)$  is regular.)

Prove that the decision problem whether  $\mathcal{L}(P) \cap \mathcal{L}(G) = \emptyset$  is undecidable .