

Theoretical Foundations of the UML WS 17/18

— Exercise Sheet 2 —

Hand in until November 7th before the exercise class.

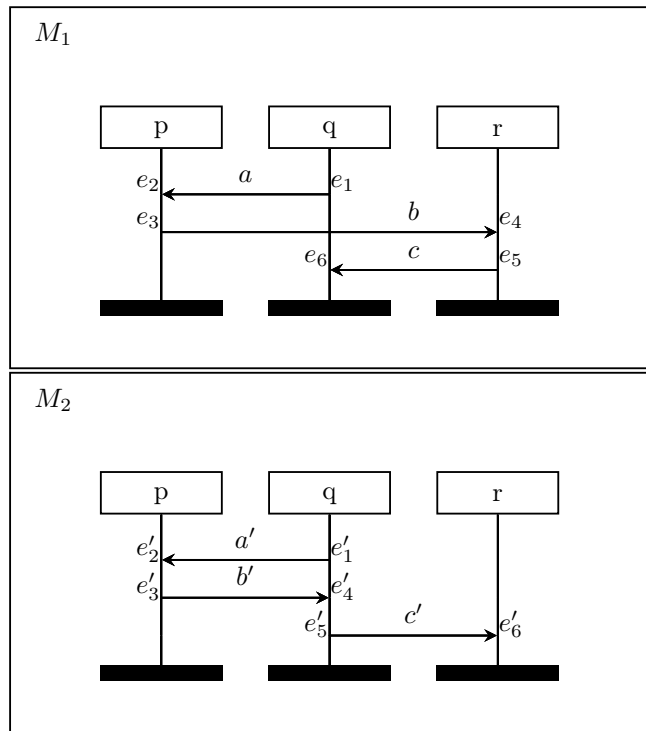
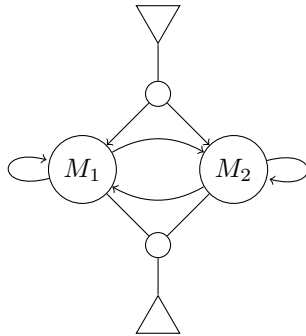
General Remarks

- The exercises should be solved in groups of *three* students.
- You may hand in your solutions for the exercises just before the exercise class starts at 15:30 or by dropping them into the “TFUML” box at our chair. Do *not* hand in your solutions via L2P.
- There will be no exercise class on October 31st. Hence, you can hand in your solutions until November 7th.

Exercise 1

(6 Points)

Consider the MSG \mathcal{G} :

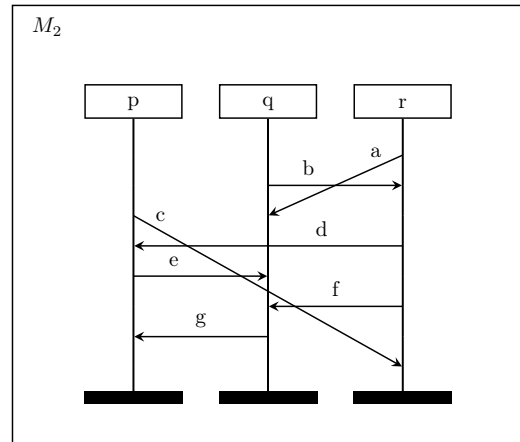
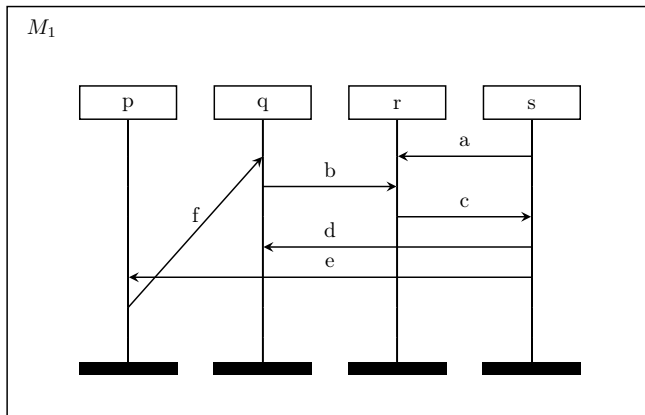


- Give 3 different accepting paths of the MSG \mathcal{G} and the MSC language $L(\mathcal{G})$.
- Determine the word language $Lin(L(\mathcal{G}))$ of MSG \mathcal{G} .
- Determine the races in the MSG \mathcal{G} and justify your answer.

Exercise 2

(2 Points)

Two diagrams are given:

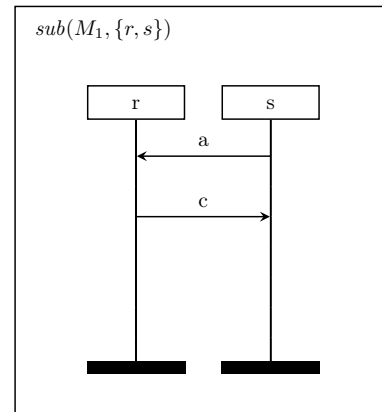
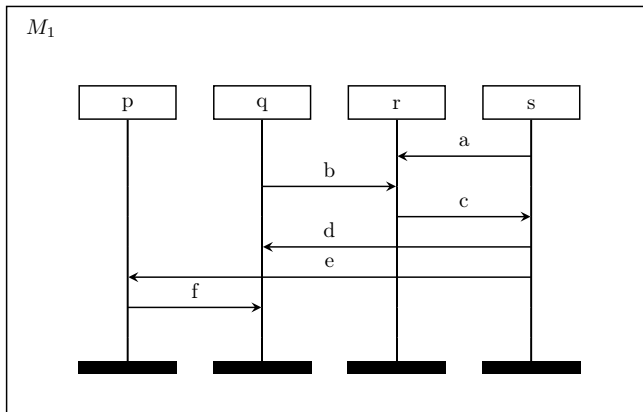


- a) Is M_1 an MSC? Justify your answer.
- b) Does M_2 have a race? Justify your answer.

Exercise 3

(6 Points)

For an MSC $M = (\mathcal{P}, E, \mathcal{C}, l, m, \preceq)$ and a non-empty subset of processes $\mathcal{P}' \subseteq \mathcal{P}$ we consider the sub-MSC $sub(M, \mathcal{P}')$ which arises from M by erasing all processes in $\mathcal{P} \setminus \mathcal{P}'$ as well as the incoming and outgoing messages of these processes. For example, we depict an MSC M_1 and the sub-MSC $sub(M_1, \{r, s\})$ below.



Exercises:

- a) Provide the formal definition of the MSC $sub(M, \mathcal{P}')$.
- b) Prove or disprove: If M is race-free then $sub(M, \mathcal{P}')$ is race-free.
- c) Prove or disprove: If $sub(M, \mathcal{P}')$ is race-free then M is race-free.

Exercise 4

(6 Points)

In the lecture it was shown that concatenation of MSCs does not preserve race-freeness:

$$(M_1 \text{ is race-free} \wedge M_2 \text{ is race-free}) \not\Rightarrow M_1 \bullet M_2 \text{ is race-free}$$

We will now have a look at the other direction:

PROPOSITION 2.1:

$$(M_1 \text{ has a race} \vee M_2 \text{ has a race}) \Rightarrow M_1 \bullet M_2 \text{ has a race}$$

Prove or disprove Proposition 2.1.