

## Exercise 5

Suppose states are the same for  $S_1, S_2$ . Then take  $x_{12} \in S_1 - S_2$  and  $x_{21} \in S_2 - S_1$ .

If we provide to the algorithm  $S_1$  with comparison of  $x_{12}$  and  $x_{21}$  then the algorithm will assume that  $x_{12}$  is more frequent.

For  $S_2$   $x_{21}$  is more frequent. The storage is the same by induction after providing either  $S_1$  or  $S_2$ . If the input is extended and some other data is provided afterwards, the output also will be the same, therefore the algorithm makes a mistake with one of the input values. Initial assumption is false.