PROMI – FIRST RECITATION

TASK 1.1

Model the following behavioural patterns as a Petri net system (activities are modelled as distinct Petri net transitions).

- There is a choice between the execution of two activities A and B.
- Two activities A and B can be executed in either order. Consider this case without imposing assumptions on the net structure and under the assumption that the resulting net is a workflow net. Also, consider solutions where A and B are enabled concurrently and solutions where this is not the case.
- Two activities A and B are executed in a sequential order.
- Two activities A and B are executed in a sequential order and this fragment may be repeated at most three times. Again, consider a solution without any assumption on the net structure and one under the assumption of a workflow net structure. Consider workflow net solutions where it is mandatory to execute the sequence of A and B and those where it is optional to execute it.
- Consider the execution of two sequences of activities A,B and C,D, where both sequences can be executed in either order, but they shall not be interleaved (i.e., ABCD and CDAB are valid traces, ACBD is not a valid trace).
- There is a decision point at which one or more (in the extreme case all) of a set of activities, say \{A,B,C,D\} are executed in any order.

TASK 1.2

Consider two special classes of workflow nets (WF-nets):

A WF-net \(N=(P,T,F)\) is an **S-WF-net** if and only if all transitions \(t \in T\) have at most one place in their preset and at most one place in their postset.

A WF-net \(N=(P,T,F)\) is a **T-WF-net** if and only if all places \(p \in P\) have at most one transition in their preset and at most one transition in their postset.

For both classes of nets, net systems are derived by constructing an initial marking that marks the sole input place of the workflow net structure.
Answer the following questions:

1. For an S-WF-system, how large is the RG relative to the net system in the worst case?
2. For an S-WF-system, is there an upper bound for the number of tokens per place in each reachable marking?
3. For a T-WF-system, how large is the RG relative to the net system in the worst case?
4. For a T-WF-system, is there an upper bound for the number of tokens per place in each reachable marking?

**TASK 1.3**

For each of the following Petri net systems, determine the size of the set of traces of the model.