Technische Universität München **Summer Term 2019**
I7
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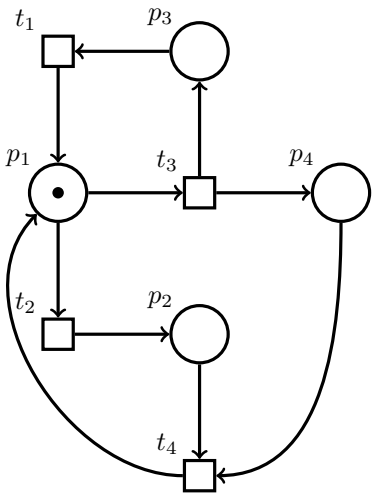
Petri nets — Homework 3

Exercise 3.1
Consider the following net $\mathcal{N} = (P, T, F)$:



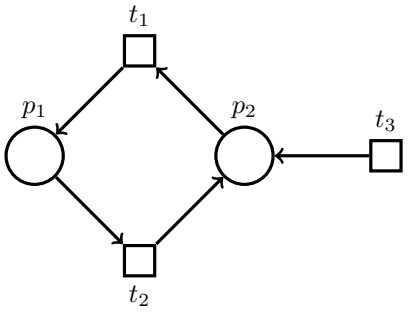
(a) Draw a coverability graph for $(\mathcal{N}, \{p_1\})$.

(b) Is $(\mathcal{N}, \{p_1\})$ bounded? If so, why? If not, which places are bounded?

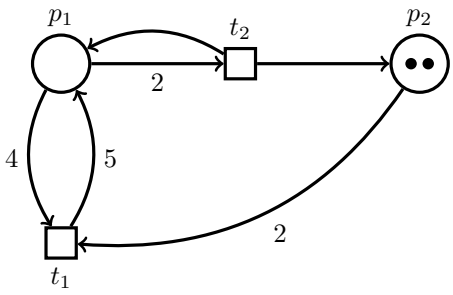
(c) Describe the set of markings coverable from $\{p_1\}$.

(d) We say that a Petri net $(\mathcal{N}, M_0)$ terminates if all its firing sequences are finite. Does $(\mathcal{N}, \{p_1\})$ terminate? Justify your answer.

Exercise 3.2
The algorithm Coverability-Graph does not specify how the coverability graph should be traversed during its construction. Show that different traversal strategies can lead to different coverability graphs. More precisely, exhibit a marking M and two different coverability graphs for $(\mathcal{N}, M)$, where $\mathcal{N}$ is the following net:



Exercise 3.3
Let $\mathcal{N}$ be the Petri net below.



Apply the backwards reachability algorithm to describe the set of initial markings from which $M = \{p_2, p_2\}$ is coverable in $\mathcal{N}$. Record all intermediate sets of markings with their finite representation of minimal elements.

Exercise 3.4
Give a procedure to decide the following problem:

Given a Petri net $(\mathcal{N}, M_0)$ and a transition sequence σ, is there a transition sequence σ' such that $\sigma'\sigma$ is enabled at M_0?

For the procedure, you may use any already known decision procedures and algorithms such as coverability graph and backwards reachability, or you may adapt those algorithms or use parts of them.