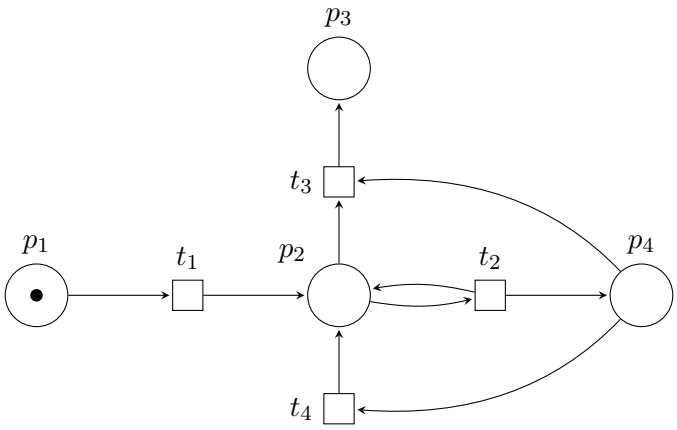
Homework 11

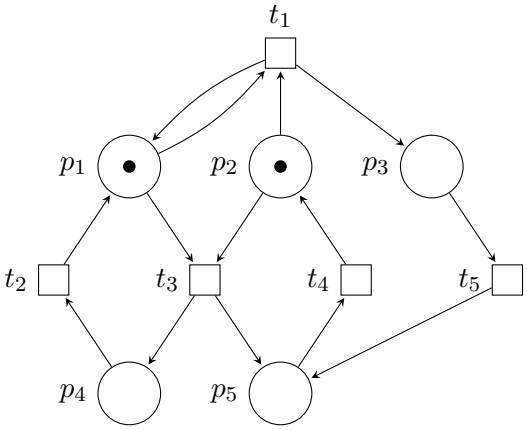
To hand in on January 11th at 14:00, during the exercise session or by mail at `marie.fortin@lsv.fr`.

Exercise 1. Construct a coverability graph for the Petri net below:



Exercise 2. Let $\mathcal{N} = \langle P, T, F, W, m_0 \rangle$ be a Petri net. Show that if $\mathcal{N}$ has an invariant x such that $x(p) > 0$ for every place $p \in P$, then there exists k such that $\mathcal{N}$ is k-safe.

Exercise 3. Let $\mathcal{N}$ be the following Petri net:



1. We say that a trap $S \subseteq P$ is *minimal* when there is no other trap S' such that $\emptyset \subsetneq S' \subsetneq S$. Give an example of a minimal marked trap in $\mathcal{N}$.

2. Give examples of two (linearly independant and non-null) invariants.

3. Using invariants and traps, prove that p_3 and p_4 cannot be marked concurrently in any reachable marking.

Exercise 4. Using invariants and traps, show that in the Petri net below, we have $M(p_1) < 2$ for all reachable markings M.