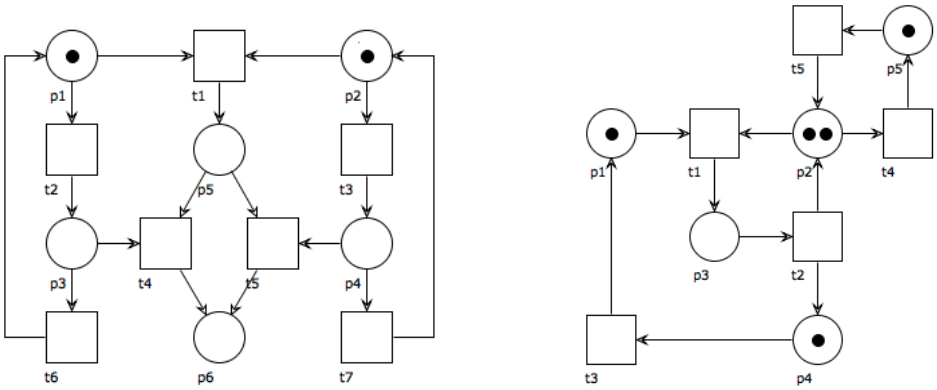
MPB 2019/20 – Nov 13, 2019



(a) $M_0 = p_1 + p_2$ (b) $M_0 = p_1 + 2p_2 + p_4 + p_5$

Figura 1: Two net systems

[**Ex. 1**] Explain the concept of *vertical abstraction*.

[**Ex. 2**] What is the difference between a *case* and a *procedure*?

[**Ex. 3**] Describe the *cost leadership* business strategy.

[**Ex. 4**] Consider a net system (P, T, F, M_0). Formalize the statement "*the place* p_1 *is not live*".

[**Ex. 5**] Consider the system in Figure 1(a).
(i) Prove that the system is bounded by exhibiting a suitable S-invariant.
(ii) Draw the reachability graph G (five vertices, nine edges).
(iii) By looking at G, is the system deadlock free? (explain)
(iv) Is the system live? (explain)
(v) By looking at G, is the system safe? (explain)
(vi) By looking at G, is the system cyclic? (explain)

[**Ex. 6**] Consider the system in Fig. 1(b). Exploit the Marking Eq. Lemma:
(i) to find the marking reached after having fired the sequence

$$\sigma = t_1\ t_4\ t_5\ t_5\ t_2\ t_3\ t_3\ t_4\ t_1\ t_5\ t_2\ t_1\ t_3;$$

(ii) to prove that the sequence

$$\sigma' = t_5\ t_4\ t_1\ t_4\ t_3\ t_2\ t_5\ t_1\ t_3\ t_5\ t_2\ t_4\ t_3\ t_2$$

is not fireable from M_0.

[**Ex. 7**] Consider the system in Figure 1(b).
(i) Is it a T-system? (explain)
(ii) Is it strongly connected? (explain)
(iii) Find a positive T-invariant.