Exercise 29

Given PTN N as shown on the right. *Justify* your answers to the following questions.
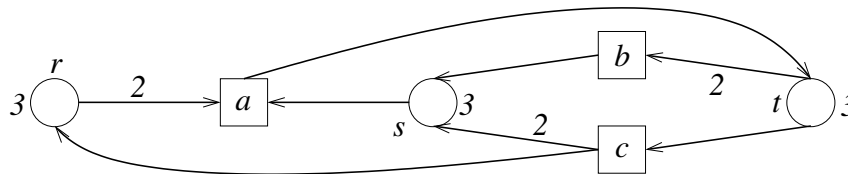

a) Specify N formally as 5-tuple $N = (P, I, T, G, C)$ including all of its components.

b) How many different markings are possible in N *theoretically*?

c) Is there a marking M for N such that all transitions are enabled?
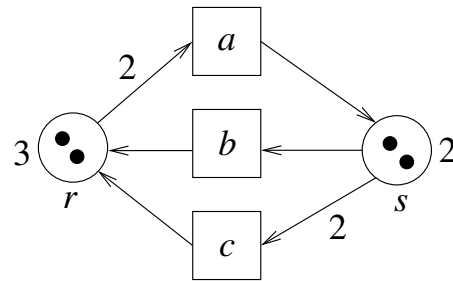
Exercise 30

Given PTN N as shown above. *Justify* your answers to the following questions.

a) How many different markings are possible in N *theoretically*?

b) Given markings $M_1 = \{(r,1), (s,3), (t,1)\}, M_2 = \{(r,1), (s,2), (t,1)\}, M_3 = \{(r,2), (s,2), (t,1)\}$ and $M_4 = \{(r,2), (s,1), (t,1)\}$. Determine the set of all transitions which are enabled in M_1, M_2, M_3 and M_4, respectively.

c) Given marking $M = \{(r,2), (s,1), (t,2)\}$. For all transitions t enabled in M, determine marking M' obtained from firing t in M.

Exercise 31

Draw the LTS for PTN N from Exercise 29 with the initial marking as given in the figure.

Exercise 32

a) Transform $\neg\forall x.\ (\phi \to \psi)$ into $\exists x.\ (\phi \wedge \neg\psi)$ and specify all intermediate steps.

b) Reformulate $\forall x.\ (\phi \leftrightarrow \psi)$ using only $\exists$ and operators $\neg$ and $\wedge$. Specify all intermediate steps.

c) Explain in your own words the effects of reordering quantifiers. More precisely, explain the semantical difference between $\forall x \exists y.\ \phi$ and $\exists y \forall x.\ \phi$ in general.