Concurrent Processes & Petri Nets

Problem 1

An intersection is controlled by traffic lights (that is, red, yellow, and green). Each road is handled by one sub-system. Model the traffic lights controller as a Petri net. The light sequence should be red-yellow-green-yellow-red. The controller must guarantee that in no case cars on both roads can drive.

Specify the set $P$, the set $T$, the set $I$, the set $O$, and the initial marking $\mu$.

Problem 2

Consider the following non-persistent encoding of Booleans:

\[
\begin{align*}
T &= \text{true}.0 + \text{not}.F \\
F &= \text{false}.0 + \text{not}.T
\end{align*}
\]

Define processes AND, OR, NAND, XOR, and NOR that interact with two Booleans and yield a new Boolean that denotes the result of the operation. Note that you cannot use short-circuit evaluation.

Problem 3

Define a 3-bit-Integer $I^3(b_0, b_1, b_2)$ using process equations. The names $b_0$, $b_1$, and $b_2$ denote bits. If a bit is set then the corresponding name appears as $\overline{b_i}$ in the process equation.

Submission deadline: Thursday, March 4, 2004, 12:40 p.m.