3. Exercise sheet: Petri Nets

**Exercise 1**
Model a traffic light by a Petri-Net.

1. You can use any number of places, however only multiplicity 1 is allowed.
2. Now only 3 places (one for each color) may be used, but there are no restrictions on the multiplicities.

**Exercise 2**
Prove or give a counterexample: $m[q]m' \leq m' = m + \Delta q$.

**Exercise 3**
Model the following Handshaking protocol by a Petri-Net:

Two processes P1 and P2 mutually exchange messages. P1 is the sender and P2 the receiver. P1 starts in state *Ready-to-Send*. When it has sent a message to P2, it moves into the state *Ready-to-Receive* and waits for an acknowledgement ACK sent by P2. Once the acknowledgement has been arrived, P1 can send more messages. P2 starts in state *Waiting-for-Messages*. If it receives a message, it confirms by sending an acknowledgement ACK to P1 and waits for more messages.

**Exercise 4**
Model the following Reader-Writer synchronization protocol with a P/T Petri Net: There are $k$ processes that compete for a resource $p^*$. Only one process is allowed to write to $p^*$ at a time, but at most $k$ processes are allowed to read $p^*$ in parallel.