MITRO207-2018
Homework 1

Problem 1: muddy children

How would the state evolution depicted in slides 88-91 (Fig. 1.6 in the textbook) change if the father announces at noon:

- Child 1 is dirty.
- There are an odd number of dirty children.
- There are an even number of dirty children.

Problem 2: distinct input complex

Three processes, P, Q, and R, are assigned *distinct* inputs from the set $\{0, 1, 2\}$. Draw the complex of all possible assignments.

Problem 3: exact message losses

Draw the complex of states corresponding to one round of the 2-process system in slide 52, assuming that *exactly* one message is lost in each round.

Problem 4: Peterson's lock

Consider the following simplified variant of Peterson's 2-process mutual exclusion algorithm:

```
Shared atomic variables:
  flag[0], flag[1]: boolean atomic registers
  turn: atomic register

Code for process p_i (i=0,1):
  flag[i] := true
  turn := 1-i
  if (flag[1-i]) and (turn=1-i) then
     return false // failure
  else
     return true // critical section
```

Draw the complex of states reachable by the two processes after they complete the algorithm.