



## Lehrstuhl für Simulation

### Applied Discrete Modelling

#### Assignment 1 “Quality Tester”: DTMCs

##### **System Specification**

A quality tester is fed by material flows from two different sources. Only one of the two sources can be active, either *source 0* or *source 1*. The probability to switch from source 0 to source 1 in one step is 0.4. The one step transition probability from source 1 to source 0 is 0.3. At the beginning of the simulation source 0 is active.

Assuming, that in each time step, one item is produced, the probability for the item to test OK is 0.9 for source 0 and 0.95 for source 1.

##### **Implementation**

Construct a general DTMC solution program in a programming language of your choice. The program should compute steady state and transient solutions and import DTMC specifications in the format given in the exercise.

##### **Tasks and Questions**

Specify and draw the DTMC representing the system.

Use your program to answer the following questions:

- What is the probability that source 0 is active after 8 minutes if one time step represents one minute?
- What is the probability of producing an OK item in the next minute?
- Does this model have limiting or stationary solutions? Why?
- How long does the system need to reach a stationary solution?
- What is the probability for source 0 to be active in steady state?
- What is the average probability of producing an OK item in steady state?