

## Exercise 34: Markov Chain Monte Carlo simulation

The number of busy lines in a trunk group (Erlang system) is given by a truncated Poisson distribution

$$P(i) = \frac{\frac{A^i}{i!}}{\sum_{j=0}^n \frac{A^j}{j!}}$$

### Question 1

Generate values from this distribution by applying the Metropolis-Hastings algorithm,

### Question 2

Verify with a  $\chi^2$ -test.

For two different call types the joint number of occupied lines is given by

$$P(i, j) = \frac{1}{K} \frac{A_1^i}{i!} \frac{A_2^j}{j!}$$

### Question 3

Use Metropolis-Hastings, directly and coordinat wise to generate variates from this distribution. You can use  $A_1, A_2 = 4$  og  $n = 10$ .

### Question 4

Test the distribution with a  $\chi^2$  test

### Question 5

Optional: Redo the exercise with BUGS or other available software

The system can be extended to an arbitrary dimension, and we can add restrictions on the different call types.