STATISTICAL COMPUTATIONAL METHODS

Seminar Nr. 2

Computer Simulations of Discrete Random Variables; Discrete Methods

1. Function **rnd** in Statistics Toolbox; special functions **rand** and **randn**.

2. Using a Standard Uniform $U(0,1)$ random number generator, write Matlab codes that simulate the following common discrete probability distributions:

a. Bernoulli Distribution $Bern(p)$, with parameter $p \in (0,1)$:

$$X \left(\begin{array}{cc} 0 & 1 \\ 1-p & p \end{array} \right)$$

b. Binomial Distribution $B(n,p)$, with parameters $n \in \mathbb{N}, p \in (0,1)$:

$$X \left(\begin{array}{c} k \\ C_n^k p^k q^{n-k} \end{array} \right)_{k=\overline{0,n}}$$

c. Geometric Distribution $Geo(p)$, with parameter $p \in (0,1)$:

$$X \left(\begin{array}{c} k \\ pq^k \end{array} \right)_{k \in \mathbb{N}}$$

d. Negative Binomial Distribution $NB(n,p)$ with parameters $n \in \mathbb{N}, p \in (0,1)$:

$$X \left(\begin{array}{c} k \\ C_{n+k-1}^k p^n q^k \end{array} \right)_{k \in \mathbb{N}}$$

e. Poisson Distribution $\mathcal{P}(\lambda)$ with parameter $\lambda > 0$:

$$X \left(\begin{array}{c} k \\ \frac{\lambda^k}{k!} e^{-\lambda} \end{array} \right)_{k \in \mathbb{N}}$$