Use Excel function $int(rand()/(1-p))$ for generating random numbers of values 0 and 1 with probability $\Pr(X = 1) = p$.

1. Make in Excel three tables size $50 \times 10, 250 \times 10, 1000 \times 10$ (number of rows $\times$ number of columns) with Bernoulli distributed random numbers for $p(1) = 0.42$. Use the generated tables for calculating new column as the sum of the first 10 columns. Random numbers in this column will have Binomial distribution. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs

Estimate mean and p for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times (by press "Delete" on an empty sell, for example) and determine how often the real values of $p = 0.42$ and $\mu = np = n \cdot 0.42$ don't belong to the obtained confident intervals. **(5 points)**

2. Make in Excel three tables size $50 \times 100, 250 \times 100, 1000 \times 100$ with Bernoulli distributed random numbers for $p(1) = 0.31$. Use the generated tables for calculating new column of random numbers equal to the number of the position where 1 appears for the first time in the first 100 columns. Random numbers in this column will have Geometric distribution. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs.

Estimate mean for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times and determine how often the population mean μ does not belong to the obtained confident intervals.**(5 points)**

3. Make in Excel three tables size $50 \times 100, 250 \times 100, 1000 \times 100$ with Bernoulli distributed random numbers for $p(1) = 1/4$. Use the generated tables for calculating new column as the average of the first 100 columns. Random numbers in this column will have distribution close to the Normal distribution. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs.

Estimate mean and variance for the random variables in the obtained samples using 90% confidence intervals. For estimation of the variance use estimated mean obtained from the sample, and population mean $\mu = 1/4$, compare the obtained confidence intervals. Recalculate the tables 10 times and determine how many times the population mean μ and σ^2 don't belong to the obtained confident intervals for the both cases of estimations.**(5 points)**

4. Make in Excel three tables size $50 \times 120, 250 \times 120, 1000 \times 120$ with Bernoulli distributed random numbers for $p(1) = 1/40$. Use the generated tables for calculating new column as the sum of the first 100 columns. Random numbers in this column will have distribution close to the Poisson distribution. Find population probability distribution functions , means, variances and standard deviations and compare its with sample

frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs.

Estimate mean for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times and determine how many times the population mean μ does not belong to the obtained confident intervals. **(5 points)**

5.Use Excel function $int(rand() * 10) + 1$ for generating uniformly distributed random number from 1 to 10 with probability of $i, i = 1, 2, ...10$, $P(X = i) = p(i) = 1/10$. Make three tables size $50 \times 5, 250 \times 5, 1000 \times 5$ with uniformly distributed random numbers from 1 to 10. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs.

Estimate mean for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times and determine how many times the population mean μ does not belong to the obtained confident intervals. **(5 points)**

6. Use the previously generated tables for calculating a new column, consisting of maximum values of the random variable in the first 8 columns. Random numbers in this column will have Order statistics distribution. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs.

Estimate mean for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times and determine how many times the population mean μ does not belong to the obtained confident intervals. **(5 points)**

7. Make in Excel three tables size $50 \times 50, 250 \times 50, 1000 \times 50$ with uniformly distributed in the interval $[0, 1]$ random numbers (Use Excel function $rand()$). Use the generated tables for calculating new column as the sum of the first 50 columns. Random numbers in this column will have distribution close to the Normal distribution. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each table. Draw the graphs.

Estimate mean for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times and determine how many times the population mean μ does not belong to the obtained confident intervals. **(5 points)**

8. Make in Excel three tables size $50 \times 5, 250 \times 5, 1000 \times 5$ with exponentially distributed random numbers with the parameter $\theta = 5$ (Use function $-\ln(rand()) * \theta$). Use the generated tables for calculating new columns as the sum of the first 2,3,4,and 5 columns. Random numbers in these columns will have Gamma distributions. Find population probability distribution functions , means, variances and standard deviations and compare its with sample frequency distribution functions, averages, sample estimation of variances and standard deviations for each tables. Draw the graphs.

Estimate mean for the random variables in the obtained samples using 90% confidence intervals. Recalculate the tables 10 times and determine how many times the population mean μ does not belong to the obtained confident intervals. **(5 points)**

Use Excel stat functions as $average, stdev, confidence, frequency$ and etc.