

Computerized Simulation

Exercise No. 1

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By:

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1. Chapter 2: Exercises 1–2, 2 – 2, 3 – 2, 5 – 2, 14 – 2, 16 – 2 21 – 2, .
2. (probability theory) Let U be a random variable with the Uniform $[0, 1]$ distribution. Show that $U + 1$ also has a uniform distribution but that U^2 does not.
3. (probability theory) Describe central limit theorem. A bank teller serves customers standing in the queue one by one. Suppose that the service time X_i for customer i has mean $EX_i = 2$ (minutes) and $Var(X_i) = 1$. We assume that service times for different bank customers are independent. Let Y be the total time the bank teller spends serving 50 customers. Find $P(90 < Y < 110)$.
4. (probability theory) In a communication system each data packet consists of 1000 bits. Due to the noise, each bit may be received in error with probability 0.1. It is assumed bit errors occur independently. Find the probability that there are more than 120 errors in a certain data packet.
5. Generate $n = 100, 1000, 10000$ number of random numbers which all lie inside an ellipse with a uniform distribution.
6. Use built-in random number generator of Python to generate 1000 random numbers following a normal distribution with mean $m = 1, 2, 3, 4, 5$ and variance 1. Please find the histogram of each sample.