Assignment #5

March 8, 2023

1. What is the pdf of the Uniform Probability Distribution?
2. What are the lower and upper bounds of the interval for a Uniform Probability Distribution with a PDF of $f(x) = \frac{1}{5}$ over the interval $[0, 5]$?
3. What is the mean of a Uniform Probability Distribution with lower bound $a = 2$ and upper bound $b = 8$?
4. What is the variance of a Uniform Probability Distribution with lower bound $a = -3$ and upper bound $b = 3$?
5. If a Uniform Probability Distribution has a PDF of $f(x) = \frac{1}{10}$ over the interval $[0, 10]$, what is the probability that a randomly selected value falls between 3 and 7?
6. In quality control, a manufacturer measures the length of a certain part and uses a Uniform Probability Distribution to model the distribution of measurements. If the lower bound of the distribution is 2 cm and the upper bound is 4 cm, what is the probability that a randomly selected part has a length between 2.5 cm and 3.5 cm?
7. A lottery ticket allows players to choose 5 numbers between 1 and 50. Assuming that each number is chosen randomly with a Uniform Probability Distribution, what is the probability that a player's ticket matches all 5 numbers drawn?
8. A student is studying for a multiple-choice exam with 20 questions, each with 4 possible answers. If the student guesses randomly on each question, what is the probability that they will answer at least 15 questions correctly?
9. What is the pdf for the exponential distribution?
10. Derive the mean of the exponential distribution.
11. Derive the variance for the exponential distribution.
12. What is the relationship between the exponential distribution and the Poisson process?
13. Show that the exponential distribution abides by the memoryless principle.