Introduction to Statistics and Data Science using *eStat*

Chapter 5 Probability Distribution

5.4 Continuous Random Variable - Exponential Distribution -

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5.4 Continuous Random Variable

5.4.2 Exponential Distribution

- Most of the continuous data obtained in real life follows normal distribution, but sometimes it is not as following examples.
  - Investigate time interval of coming calls between 9am and 10am in an office.
  - Investigate time interval between defective products appearing in a factory production line.
- These examples are the data that appears when events occur at the same rate at a given time (e.g., three calls per hour, etc.).
- If the average number of events per unit hour is λ and X is time between events, then X is exponential distribution.

5.4 Continuous Random Variable

5.4.2 Exponential Distribution

- When the average number of events per unit hour is λ and X is time between events, the probability distribution function of X is as follows:

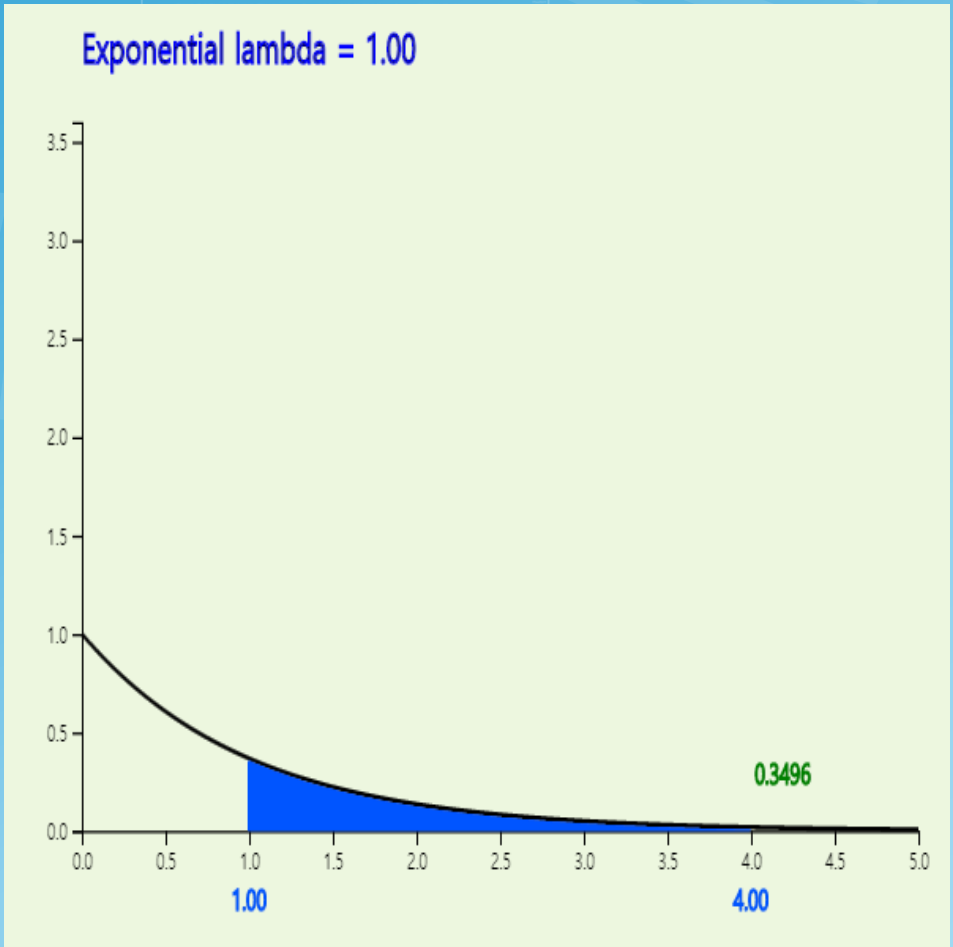
$$f(x) = \lambda \exp(-\lambda), \quad x > 0$$

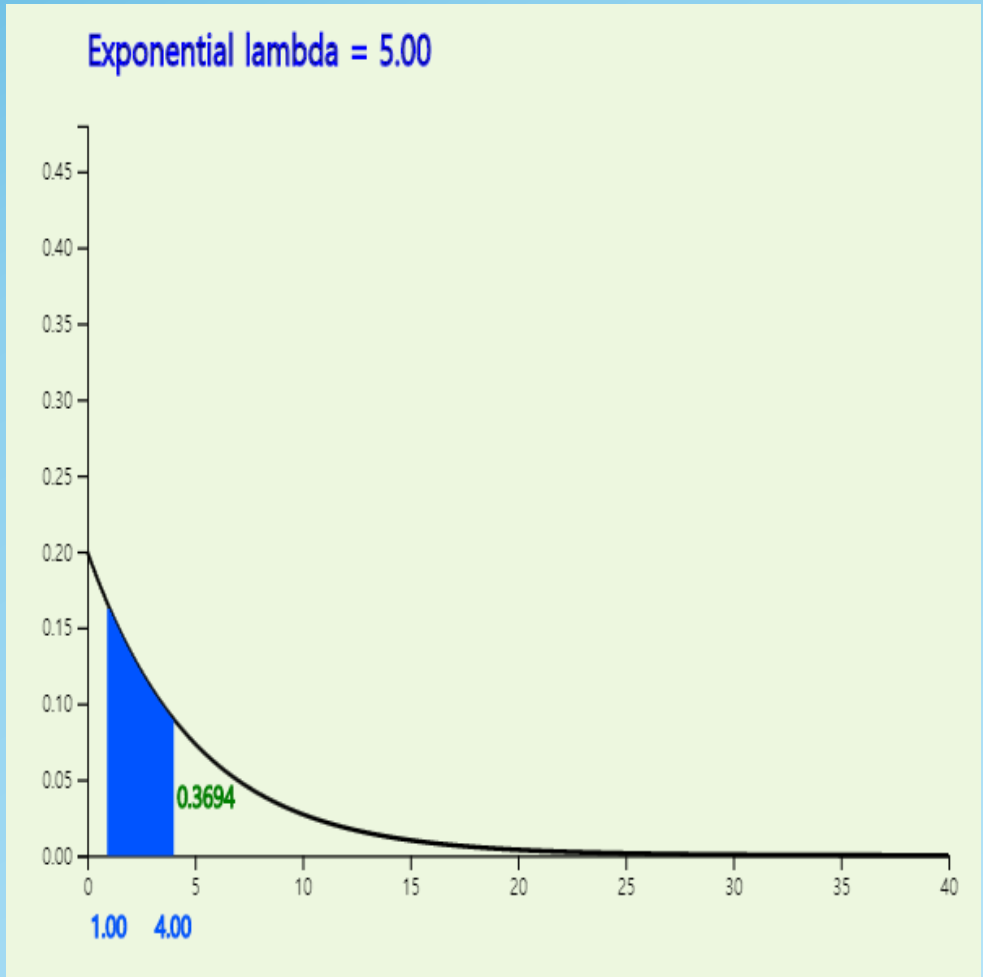
- It is called an exponential distribution.

$$E(X) = \frac{1}{\lambda}, V(X) = \frac{1}{\lambda^2}$$

5.4 Continuous Random Variable

5.4.2 Exponential Distribution





5.4 Continuous Random Variable

[Ex 5.4.7] If the average life span of a product is 10 hours and follows the exponential distribution, obtain the following probabilities using 『eStatU』.
1) What is the probability of a product having a lifespan of less than 5 hours?
2) What is the probability of a product having a lifespan more than 10 hours?
<Answer>

- **Select = 10 in 'Exponential Distribution' of 『eStatU』**

1) Enter 0 and 5 at the boxes on the 1st line below the distribution graph as follows and click [Execute] button..

2) Similarly, enter 10 and a large number 50 at the boxes on the 1st line below the distribution graph as follows and click [Execute] button..

Thank you