업데이터 통계학 스터디: ASSIGNMENT 2

---

1. $X \sim Bernoulli(p)$. Find

   (a) PMF of X

   (b) MGF of X

   (c) $E(X)$ and $Var(X)$, by using the MGF

   (d) Write what you know about the Bernoulli distribution.

2. $Y \sim Bin(n, p)$. Find

   (a) PMF of Y

   (b) MGF of Y

   (c) $E(X)$ and $Var(X)$, by using the MGF

   (d) Write what you know about the Binomial distribution.

3. Compare the MGF of the Bernoulli distribution with the MGF of the Binomial distribution. And explain the relationship between the two distributions as you know it.

4. $X \sim Geo(p)$. Find

   (a) PMF of X

   (b) MGF of X

   (c) $E(X)$ and $Var(X)$, by using the MGF

   (d) Write what you know about the Geometric distribution.

5. $Y \sim NegBin(n, p)$. Find

(a) PMF of Y

(b) MGF of Y

(c) $E(X)$ and $Var(X)$, by using the MGF

(d) Write what you know about the Negative-Binomial distribution.

6. Compare the MGF of the Geometric distribution with the MGF of the Negative-Binomial distribution. And explain the relationship between the two distributions as you know it.

7. $Z \sim Poi(\lambda)$. Find

(a) PMF of Z

(b) MGF of Z

(c) $E(Z)$ and $Var(Z)$, by using the MGF

(d) Write what you know about the Poisson distribution.

8. The probability that a certain kind of component will survive a shock test is 3/4. Find the probability that exactly 2 of the next 4 components tested survive.

9. A large chain retailer purchases a certain kind of electronic device from a manufacturer. The manufacturer indicates that the defective rate of the device is 3%.

(a) The inspector randomly picks 20 items from a shipment. What is the probability that there will be at least one defective item among these 20?

(b) Suppose that the retailer receives 10 shipments in a month and the inspector randomly tests 20 devices per shipment. What is the probability that there will be exactly 3 shipments each containing at least one defective device among the 20 that are selected and tested from the shipment?

10. For a certain manufacturing process, it is known that, on the average, 1 in every 100 items is defective. What is the probability that the fifth item inspected is the first defective item found?

11. At a "busy time," a telephone exchange is very near capacity, so callers have difficulty placing their calls. It may be of interest to know the number of attempts necessary in order to make a connection. Suppose that we let p = 0.05 be the probability of a connection during a busy time. We are interested in knowing the probability that 5 attempts are necessary for a successful call.

12. In an NBA championship series, the team that wins four games out of seven is the winner. Suppose that teams A and B face each other in the championship games and that team A has probability 0.55 of winning a game over team B.

(a) What is the probability that team A will win the series in 6 games?

(b) What is the probability that team A will win the series?

(c) If teams A and B were facing each other in a regional playoff series, which is decided by winning three out of five games, what is the probability that team A would win the series?

13. Five percent of those who use 'KU credit cards' are behind on their credit card bills. When looking at 100 users of 'KU Credit Card', find the probability that there are 10 people who are behind on their credit card bills.

14. During a laboratory experiment, the average number of radioactive particles passing through a counter in 1 millisecond is 4. What is the probability that 6 particles enter the counter in a given millisecond?