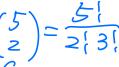
MAT1372, Classwork14, Fall2025



Hypergeometric Distribution(QR Code5)

1. A committee of 4 people is to be selected from a group of 5 men and 7 women. If the selection is made randomly, what is the probability the committee will consist of 2 men and 2 women?

randomly, what is the probability the committee will consist of 2 men and 2 w

$$P(2m 2W \mid 4pp \mid out of 12) = \underbrace{(2)(2)}_{(12)} = \underbrace{0.3939}_{(13)39}$$

2. Hypergeometric Random Variable.

How to describe a hypergeometric random variable in word?

It describes the number of successes in a fixed number of trails without replace ment.

Example: The classical application of the hypergeometric distribution is

How to describe a hypergeometric random variable in math?

Sampling who replacement. How to describe a hypergeometric random variable in word?

It describes the probability of k successes in n draws w/o replacement Example: Find the probability of the outcome of drawing k green marbles out of r total gean marbles, and draw n-k red marbles.

3. Definition of the Hypergeometric Distribution. But of b red marbles, in n rounds Suppose X is R.V. with a Hypergeometric distri, denoted by

XH (r, b, n)

The probability of exactly k observation be selected from r observation (the size of 1st group) given n (the size of the chosen sample) be picked from r+b $P(\text{exactly } k \text{ from } r \mid \text{picked } n \text{ from } r+b) = P(X = k) = \frac{(k)(n-k)}{(n-k)}$

with its mean, variance, and standard deviation of the number of observed successes

$$\mu = ---$$
, $\sigma^2 =$, $\sigma = \sqrt{n \frac{r}{r+b} (1 - \frac{r}{r+b}) \frac{r+b-n}{r+b-1}}$

- 4. A school site committee is to be chosen randomly from 6 men and 5 women. If the committee consists of 4 members chosen randomly, what is the probability that 2 of them are women? How many women do you expect to be on the committee?
- 5. Let $X \sim H(r, b, 1)$. (a) Find P(X = 0) and P(X = 1). (b) Do we have P(X = 2)? Or P(X = n) for n > 2?

4.5 Poisson Distribution

1. Poisson Distribution.

How to describe a Poisson distribution in word?

Example:

How to describe a Poisson distribution in math?

Example:

- 2. If a call center receives 20 calls between 8 a.m. and 12 p.m. What is the average calling this center gets in 15 minutes?
- 3. Definition of the Poisson Distribution.

The mean and standard deviation of this distribution are

$$\mu = \underline{\hspace{1cm}}, \qquad \sigma = \underline{\hspace{1cm}}$$

4. Tom receives about 6 telephone calls between 8 a.m. and 10 a.m. What is the probability that Tom receives more than one call in the next 15 minutes?

