

Class Exercise

1. Rankings

Five men and five women are ranked according to their scores on an exam. Assume that no two scores are the same and all possible rankings are equally likely. Let the random variable X be the highest ranking achieved by a women. What is the probability mass function of X ? Organize your solution into a table.

2. Lottery

A state has a 5/35 lottery game. The ticket costs 1\$. Matching all 5 numbers (jackpot) pays 200,000\$, matching 4 of the 5 numbers pays 200\$ and matching 3 of the 5 numbers pays 2\$. The rest of the tickets are non-winning. What is the expected value (in \$) of this game and what is the standard deviation?

3. Shifts

Show that $E(a + kX) = a + kE(X)$ and $Var(a + kX) = k^2Var(X)$ for any discrete random variable X and constants a and k .

4. Chemicals

A chemical supply company currently has in stock 50kg of a certain chemical, which it sells to customers in 5kg containers. Let X be the number of containers ordered by a randomly chosen customer. Suppose that X has pmf

x	1	2	3	4
$p(x)$	0.2	0.4	0.3	0.1

a) Compute $E(X)$, $Var(X)$ and $\sigma(X)$.

b) Compute the expected number of kg's of chemical left after the next customer's order is shipped and the standard deviation of the number of kg's left.

5. n coins

We toss n coins and each one shows heads with probability p , independently of each others. Each coin which shows heads is tossed again. What is the probability mass function of the number of heads resulting from the second round of tosses?

6. Speeding

Highway Patrol stops one of every twelve drivers who drive over the speed limit in the Airport Tunnel on HW13. In the early afternoon 750 drivers go through the Tunnel in a quarter hour and 45 of those drivers are over the speed limit.

a) What is the expected number of drivers stopped in a quarter hour and what is the standard deviation?

b) What is the probability that less than 3 drivers will be stopped in a quarter hour?