

## Seminar 3 - 2025

1. A company receives a shipment of 25 hard drives. Before accepting the shipment, 6 of them will be randomly selected and tested. Only if all 6 meet specifications, will the shipment be accepted. 4 of the 25 drives (of the shipment) are defective, what is the probability that the shipment will not be accepted?

2. In a bag there are marbles numbered from 0 to 5:

Number on the marble	0	1	2	3	4	5
Frequency (in the bag)	9	11	12	13	14	11

4 marbles are drawn randomly without replacement. Let  $X_k$  denote the  $k$ -th drawn number,  $k = \overline{1, 4}$ . Compute the following probabilities:

- (a)  $P(X_1 = 1, X_2 = 2, X_3 = 3, X_4 = 4)$ ;
- (b)  $P(\{X_1 = X_2 = 0\} \cap \{X_3 = X_4 = 5\})$ ;
- (c)  $P(\{X_1 = X_2 = X_3\} \cap \{X_2 < 2\})$ ;
- (d)  $P(\{X_1 \neq 1\} \cup \{X_2 \neq 2\} \cup \{X_3 \neq 3\})$ ;

3. Let  $M$  be a subset with 3 randomly chosen (without replacement) elements of the set  $\{2, 3, 4, 5, 6\}$  and  $N$  be a subset with 2 randomly chosen (without replacement) elements of the set  $\{0, 1, 7, 8\}$ . Let  $U = M \cup N$ . Compute the probabilities of the following events:

$A$ : “ $U$  contains only odd numbers.”

$B$ : “ $U$  contains only consecutive numbers.”

$C$ : “ $\{0, 4\} \subset U$ .”

$D$ : “ $U$  contains at least two even numbers.”

4. A person rolls a die and tosses a coin.

a) Write a sample space for this experiment.

b) What is the probability of the event  $E$ : “the person obtains the number 6 **or** heads”?

5. 9 persons get randomly on a train with 3 cars. Compute the probabilities of the following events:

$A$ : “There are exactly 3 persons in the first car.”

$B$ : “There are 3 persons in each car.”

$C$ : “There is 1 person in a car and there are 4 persons in each of the other two cars.”

$D$ : “There is at least a person in each car.”