$$P(A) = P(A_1 \cdot \overline{A}_2 \cdot \overline{A}_3) + P(\overline{A}_1 \cdot A_2 \cdot \overline{A}_3) + P(\overline{A}_1 \cdot \overline{A}_2 \cdot A_3) =$$
$$= P(A_1) \cdot P(\overline{A}_2) \cdot P(\overline{A}_3) + P(\overline{A}_1) \cdot P(A_2) \cdot P(\overline{A}_3) + P(\overline{A}_1) \cdot P(\overline{A}_2) \cdot P(A_3) =$$
$$= 0,6 \cdot 0,3 \cdot 0,2 + 0,4 \cdot 0,7 \cdot 0,2 + 0,4 \cdot 0,3 \cdot 0,8 = 0,188.$$

b) $B = A_1 \cdot A_2 \cdot \overline{A}_3 + A_1 \cdot \overline{A}_2 \cdot A_3 + \overline{A}_1 \cdot A_2 \cdot A_3,$
$$P(B) = P(A_1 \cdot A_2 \cdot \overline{A}_3) + P(A_1 \cdot \overline{A}_2 \cdot A_3) + P(\overline{A}_1 \cdot A_2 \cdot A_3) =$$
$$= P(A_1) \cdot P(A_2) \cdot P(\overline{A}_3) + P(A_1) \cdot P(\overline{A}_2) \cdot P(A_3) + P(\overline{A}_1) \cdot P(A_2) \cdot P(A_3) =$$
$$= 0,6 \cdot 0,7 \cdot 0,2 + 0,6 \cdot 0,3 \cdot 0,8 + 0,4 \cdot 0,7 \cdot 0,8 = 0,452.$$

c) $C = A_1 \cdot A_2 \cdot A_3,$
$$P(C) = P(A_1 \cdot A_2 \cdot A_3) = P(A_1) \cdot P(A_2) \cdot P(A_3) = 0,6 \cdot 0,7 \cdot 0,8 = 0,336.$$

d) $P(D) = 1 - P(\overline{A}_1) \cdot P(\overline{A}_2) \cdot P(\overline{A}_3) = 1 - 0,4 \cdot 0,3 \cdot 0,2 = 0,976.$

e) $E = \overline{A}_1 \cdot \overline{A}_2 \cdot \overline{A}_3, \quad P(E) = 0,4 \cdot 0,3 \cdot 0,2 = 0,024.$

Glossary

independent events – независимые события
mutual – взаимный; **independent in union** – независимые в совокупности
flat-printing machine – плоскопечатная машина
directory – справочник

Exercises for Seminar 4

4.1. The probability that a shooter hit in a target at one shot is equal to 0,9. The shooter has made 3 shots. Find the probability that all 3 shots will strike the target.

4.2. A coin and a die are tossed. Find the probability of joint appearance of the following events: «the coin lands on heads» and «the die lands on 6».

4.3. What is the probability that at tossing three dice 6 aces will appear at least on one of the dice (the event A)?
The answer: 0,421.

4.4. There are 8 standard items in a batch of 10 items. Find the probability that there is at least one standard item among two randomly taken items.

4.5. Two dice are rolled. What is the conditional probability that at least one lands on 6 given that the dice land on different numbers?

4.6. The probability of hit in a target by the first shooter at one shot is equal to 0,8, and by the second shooter – 0,6. Find the probability that the target will be struck only with one shooter.
The answer: 0,44.

4.7. The probability to receive high dividends under shares at the first enterprise – 0,2; on the second – 0,35; on the third – 0,15. Determine the probability that a shareholder having shares of all the enterprises will receive high dividends:
a) only at one enterprise;
b) at least on one enterprise (a share – акция).
The answer: a) 0,4265; b) 0,558.

4.8. The first brigade has 6 tractors, and the second – 9. One tractor demands repair in each brigade. A tractor is chosen at random from each brigade. What is the probability that:
    a) both chosen tractors are serviceable;
    b) one of the chosen tractors demands repair (serviceable – исправный).
    The answer: a) 20/27; b) 13/54.

Exercises for Homework 4

4.9. There are items in two boxes: in the first – 10 (3 of them are standard), in the second – 15 (6 of them are standard). One takes out at random on one item from each box. Find the probability that both items will be standard.
    The answer: 0,12.

4.10. There are 3 television cameras in a TV studio. For each camera the probability that it is turned on at present, is equal to $p = 0,6$. Find the probability that at least one camera is turned on at present (the event A).
    The answer: 0,936.

4.11. What is the probability that at least one of a pair of dice lands on 6, given that the sum of the dice is 8?
    The answer: 0,4.

4.12. 10 of 20 savings banks are located behind a city boundary. 5 savings banks are randomly selected for an inspection. What is the probability that among the selected banks appears inside the city:
    a) 3 savings banks; b) at least one?
    The answer: a) 0,348; b) 0,984.

4.13. There are 16 items made by the factory № 1 and 4 items of the factory № 2 at a collector. Two items are randomly taken. Find the probability that at least one of them has been made by the factory № 1.
    The answer: 92/95.

4.14. Three buyers went in a shop. The probability that each buyer makes purchases is equal to 0,3. Find the probability that:
    a) two of them will make purchases;
    b) all three will make purchases;
    c) only one of them will make purchases.
    The answer: a) 0,189; b) 0,027; c) 0,441.

4.15. Three students pass an exam. The probability that the exam will be passed on "excellent" by the first student is equal to 0,7; by the second – 0,6; and by the third – 0,2. What is the probability that the exam will be passed on "excellent" by:
    a) only one student; b) two students;
    c) at least one; d) neither of the students?
    The answer: a) 0,392; b) 0,428; c) 0,904; d) 0,096.

4.16. Three shots are made in a target. The probability of hit at each shot is equal to 0,6. Find the probability that only one hit will be in result of these shots.
    The answer: 0,288.