1 Wahrscheinlichkeitsrechnung

Englische Aufgaben

1.1 A hotel safe is locked by a five-digit code. The first digit has to be between 1 and 9, the other digits are between 0 and 9. Compute the number of combinations possible,
a. if each digit is allowed to appear only once.
b. if multiple appearances of a single digit are allowed.
[five-digit …fünfstellig; digit … Ziffer]

1.2 A key-safe is secured by a lock consisting of four numbered wheels containing the numbers 0 to 9 each. Steven knows the first and the last digit of the code he has forgotten the other two.
a. Compute the number of possible combinations, if we assume that the missing digits may be the same.
b. Assume it takes Steven about 6 seconds to check a number combination and compute the time it would take to try out each code.

1.3 In a clothing store there are five red pullovers, seven blue, eight green and three grey ones of the same type. Compute the number of combinations possible for piling the pullovers,
a. if the pullovers are sorted by colour.
b. if the pullovers are not sorted by colour.
[to pile … stapeln]

1.4 Trevor wants to reorganize a part of his tool kit. He owns four drills of various size, five different screwdrivers and three different hammers. The tools shall be sorted typewise and stored in three separate drawers in a cupboard. Compute the number of combinations possible for sorting the tools.
[tool kit/tools … Werkzeug; drill … Bohrer; screwdriver … Schraubenzieher; hammer … Hammer]

1.5 In a high school, three out of 84 pupils are chosen for student representation.
a. The student with the most number of votes is elected representative of the student body, the person with the second most number of votes is elected to be his or her deputy, whereas the third person is to be the substitute of the other two. Compute the number of possible outcomes of the election.

b. Compute the number of elected teams possible, if the three selected students form a team on equal terms, independently from the number of votes each pupil got.
[student representation … Schülervertretung; elected representative of the student body … Schulsprecher; deputy/substitute … Stellvertreter; on equal terms … gleichgestellt]

1.6 At an international school, 45% of the pupils are from Austria, 15% from France, 8% from the Netherlands, 22% from the United Kingdom and the remaining percentage from Switzerland. Compute the probability that a randomly chosen student is

a. from Switzerland,

b. from the UK or the Netherlands,
c. not from Austria,
d. not from France or Switzerland.
[probability … Wahrscheinlichkeit; randomly … zufällig]

1.7 In Carl's bookshelf there are 25 science fiction and fantasy books. Among these are eight books written by J.R.R. Tolkien, including "The lord of the rings". Carl randomly (without looking) takes three books off the shelf to lend them to a friend.
a. Compute the probability that neither of the three books is written by J.R.R. Tolkien.

b. Compute the probability that at least one of the three books is written by J.R.R. Tolkien.
c. Compute the probability that "The lord of the rings" is among the selected books.

1.8 Sarah and Peter are playing a game of cards. They have a four-color deck with each 13 cards in the "colors" spades (black), clubs (green), hearts (red) and diamonds (blue). The person having a turn would draw a single card from the deck, write down the color and put the card back. The procedure is repeated four times, then it is the other person's turn. The winner is the one with more hearts on the list.
a. Compute the probability that Peter has exactly two hearts on his list.

b. Compute the probability that Sarah has at least one heart on her list.

c. Assume, the drawn cards are not put back in the deck and compute the probabilities of **a.** and **b.**, respectively, again.
[four-color deck … vierfarbige Spielkarten; to have a turn … an der Reihe sein; to draw a card … eine Karte ziehen]

1 Wahrscheinlichkeitsrechnung

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1.9 A certain exam at an university is conducted by three different professors. About 35% of the students take the exam by professors A and B each, the remaining percentage by professor C. From experience it is known that 3%, 5% and 6% of professors A's, B's and C's examinees fail the test.

a. Visualize the situation in a tree diagram.

b. Compute the probability that a randomly chosen student has failed the test.

c. A student has failed the test. Compute the probability that he has taken the exam by professor B.

d. A Student has passed the exam. Compute the probability the examination was conducted by professor C.

[to conduct an examination … eine Prüfung abnehmen; to take an exam … eine Prüfung ablegen; to fail … durchfallen; examinee … Prüfling; tree diagram … Baumdiagram; to pass… bestehen]

1.10 In a casket there are 10 black, 20 white and 2 red bullets. Someone draws three bullets **(1)** with **(2)** without putting them back in the casket.

a. Compute the probability that one of the three bullets is red.

b. Compute the probability that all three bullets are black.

c. The first two bullets are white. Compute the probability, that the last one is red.

[casket … Urne; bullet … Kugel]

1.11 A laboratory test diagnoses a certain disease with a probability of 97%, if a person is actually suffering from the disease. However, the test shows with probability of 0.95% a "false positive" result, i.e., the test diagnoses the disease for a healthy person. It is assumed that 2% of the population suffer from this disease.

a. Visualize the situation in a tree diagram.

b. Compute the probability that a randomly selected person is tested positively.

c. Compute the probability that a positively tested person is actually ill.

[i.e. (id est) … das heißt]