Exercises Tutorial 1 (11-04-2024)

Exercise 1

Registrants at a large convention are offered 6 sightseeing tours on each of 3 days. In how many ways can a person arrange to go on a sightseeing tour planned by this convention?

Exercise 2

In a medical study, patients are classified in 8 ways according to whether they have blood type AB^+, AB^-, A^+, A^-, B^+, B^-, O^+, O^-, and also according to whether their blood pressure is low, normal or high. Find the number of ways in which a patient can be classified.

Exercise 3

Students at a private liberal arts college are classified as being freshmen, sophomores, juniors, or seniors, and also according to whether they are male or female. Find the total number of classifications for the students of that college.

Exercise 4

A Californian study concluded that following 7 simple health rules can extend a man's life by 7 years. These 7 rules are as follows: no smoking, get regular exercise, use alcohol only in moderation, get 7 to 8 hours of sleep, maintain proper weight, eat breakfast, and do not eat between meals. In how many ways can a person adopt 5 of these rules to follow

1. if the person presently violates all 7 rules?
2. if the person never drinks and always eats breakfast?

Exercise 5

A developer of a new subdivision offers a prospective home buyer a choice of 4 designs, 3 different heating systems, a garage carport, and a patio or screened porch. How many different plans are available to this buyer?

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Exercise 8

A witness to hit-and-run accident told the police that the license number contained the letters RLH followed by 3 digits, the first of which was a 5. If the witness cannot recall the last 2 digits, but is certain that all three digits are different, find the maximum number of automobile registrations that the police may have to check.

Exercise 9

In how many ways can 6 people be lined up to get on a bus?

1. If 3 specific persons, among 6, insist of following each other, how many ways are possible?
2. If 2 specific persons, among 6, refuse to follow each other, how many ways are possible?

Exercise 10

If a multiple-choice test consists of 5 questions, each with 4 possible answers of which only 1 is correct,

1. in how many different ways can a student check off one answer to each question?
2. in how many ways can a student check off one answer to each question and get all the answers wrong?

Exercise 11

1. How many distinct permutations can be made from the letters of the word COLUMNS?
2. How many of these permutations start with the letter M?

Exercise 12

How many three-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5 and 6, if each digit can be used only once?

1. How many of these are odd numbers?
2. How many are greater than 330?

Exercise 13

In how many ways can 4 boys and 5 girls sit in a row if the boys and girls must alternate?

Exercise 14

In how many ways can 5 different trees be planted in a circle?

Exercise 15

How many distinct permutations can be made from the letters of the word INFINITY?

Exercise 16

How many ways can 3 oaks, 4 pines and 2 maples be arranged along a property line if one does not distinguish among trees of the same kind?

Exercise 17

How many ways are there to select 3 candidates from 8 equally qualified recent graduates for openings in an accountant firm?

Exercise 18

How many ways are there that no two students will have the same birth date in a class of size 60?

Exercise 19

How many ways are there to pick 1 letter from 3 A's, 5 B's, and 7 C's?

Exercise 20

How many ways are there to pick 5 pieces of fruit from 7 oranges and 8 apples

Exercise 21

How many ways are there to choose 1 Dutch and 1 English book from 5 Dutch books and 7 English books?

Exercise 22

How many ways are there to throw a die and pick a card from a deck?

Exercise 23

How many ways are there to arrange the spades of a deck of cards in a sequence?

Exercise 24

How many "words" are there with the letters of the word MISSISSIPPI?

Exercise 25

How many words can be constructed from r letters R and n-r letters C?

Exercise 26

How many sequences of 3 zeroes and 11 ones are possible?

Exercise 27

List the elements of each of the following sample spaces:

1. The set of integers between 1 and 50 divisible by 8.
2. the set S = $\{x|x^2 + 4x - 5 = 0\}$
3. the set S = $\{x|x$ is a continent$\}$

Exercise 28

Describe the sample space S consisting of all points in the first quadrant inside a circle of radius 3 with center at the origin.

Exercise 29

An experiment involves tossing a pair of dice, one green and one red, and recording the numbers that come up. If x equals the outcome on the green die and y the outcome on the red die, describe the sample space S.

1. by listing the elements of (x, y)
2. list the elements corresponding to the event A that the sum is greater than 8.
3. list the elements corresponding to the event B that a 2 occurs on either die.
4. list the elements corresponding to the event C that a number greater than 4 occurs on the green die.
5. list the elements corresponding to the event $A \cap C$
6. list the elements corresponding to the event $A \cap B$
7. list the elements corresponding to the event $B \cap C$

Exercise 30

Two jurors are selected from 4 alternates to serve at a murder trial. Using the notation $A_1\,A_3$ for example, to denote the simple event that alternates 1 and 3 are selected, list the 6 elements of the sample space S.

Exercise 31

Consider the sample space S = { copper, sodium, nitrogen, potassium, uranium, oxygen, zinc } and the events
A = { copper, sodium, zinc }
B = { sodium, nitrogen, potassium }
C = { oxygen }
List the elements of the sets corresponding to the following events:

1. A'
2. $A \cup C$
3. $(A \cap B') \cup C'$
4. $B' \cap C'$
5. $A \cap B \cap C$
6. $(A' \cup B') \cap (A' \cap C)$

Exercise 32

If S = $\{x|0 < x < 12\ , x \in \mathbb{R}\}$, M = $\{x|1 < x < 9, x \in \mathbb{R}\}$ and N = $\{x|0 < x < 5, x \in \mathbb{R}\}$, find

1. $M \cup N$
2. $M \cap N$
3. $M' \cap N'$

Exercise 33

If each coded item in a catalog begins with 3 distinct letters followed by 4 distinct nonzero digits, find the probability of randomly selecting one of these coded items with the first letter a vowel and the last digit being even.

Exercise 34

An automobile manufacturer is concerned about a possible recall of its best-selling four-door sedan. If there were a recall, there is a probability of 0.25 of a defect in the brake system, 0.18 of a defect in the transmission, 0.17 of a defect in the fuel system, and 0.40 of a defect in some other area.

1. What is the probability that the defect is the brakes or the fueling system if the probability of defects in both systems simultaneously is 0.15?
2. What is the probability that there are no defects in either the brakes or the fueling system?

Exercise 35

If a letter is chosen at random from the English alphabet, find the probability that the letter

1. is a vowel exclusive of y
2. is listed somewhere ahead of the letter j
3. is listed somewhere after the letter g

Exercise 36

A pair of fair dice is tossed. Find the probability of getting

1. a total of 8
2. at most a total of 5

Exercise 37

In a poker hand consisting of 5 cards, find the probability of holding

1. 3 aces
2. 4 hearts and 1 club.

Exercise 38

If three books are picked at random from a shelf containing 5 novels, 3 books of poems, and a dictionary, what is the probability that

1. the dictionary is selected?
2. 2 novels and 1 book of poems are selected?

Exercise 39

In a high school graduating class of 100 students, 54 students studied mathematics, 69 students studied history, and 35 studied both mathematics and history. If one of these students is selected at random, find the probability that

1. the student took mathematics or history?
2. the student did not take either of these subjects?
3. the student took history but not mathematics?