



Statistics Competition 2024.

Questionnaire checking

A - Upper secondary

1 - Basic knowledge test

Version: 1 Language: en

1.

The mean and variance of 100 values of a sample are 5 and 3 respectively. If for the 99 values,

$$\sum_{i=1}^{99} (x_i - \bar{x})^2 = 50$$

The hundredth value is:

- A. 20,81 or -10,81
- B. 19,14 or -9,14
- C. 24,21 or 18,21
- D. 17,14 or -18,21

2.

Three students A, B and C independently solve an exercise with probability of correct solution $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{2}{5}$, respectively. They submit, without revealing their identity, their solution and the professor finds two correct answers. The probability that student A gave the wrong answer is:

- A. 0,22
- B. 0,44
- C. 0,33
- D. 0,50

3.

A Ferris wheel has a diameter of 98 meters and rotates at a constant speed. The bottom of the wheel is 3 meters above the level of its base. In a complete rotation the probability that a randomly selected seat is at least 30 meters above the base level is:



- A. 0,83
- B. 0,66
- C. 0,34
- D. 0,65

4.

Let A and B be two events of the same sample space for which, $P(A \cup B) = \frac{5}{12}$, and $(\frac{1}{2}, \frac{1}{12})$ is an inflection point for the graph of the function

$$f(x) = P(A)x^3 - x^2 - P(B|A)x + \frac{1}{2}$$

The probability P(B) is:

- A. $\frac{2}{3}$
- B. $\frac{1}{4}$
- C. $\frac{1}{12}$
- D. $\frac{1}{3}$

5.

Let $A = \{\alpha_1, \alpha_2, \alpha_3\}$ and $B = \{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5\}$ and F the set of all functions $f: A \rightarrow B$. A function is chosen at random from the set F . The probability the function chosen to be injective (1-1) is:

- A. 0,25
- B. 0,08

C. 0,48

D. 0,3

6. The mean and standard deviation of 15 numbers is 3 and 1 respectively. If we add the number 3 to the double of each number, then the new mean and the new standard deviation will be respectively:

A. 6 and 2

B. 6 and 4

C. 9 and 7

D. 9 and 4

7.

The following table shows the applications by faculty and by gender that were accepted (YES) or rejected (NO) by the four faculties of a university for the current academic year.

Faculty	Philosophy		Polytechnic		Economics		Science		Total	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Men	121	43	250	68	210	97	149	60	730	268
Women	270	53	102	39	220	90	99	53	691	235
Total	391	96	352	107	430	187	248	113	1421	503

Based on the above data, only two of the following statements are correct. Which of the statements are correct?

A. This particular university favored applications for admission from women.

B. One first-year student is selected at random. Given that the student attends either the Faculty of Philosophy or the Faculty of Science, the probability that she is a woman is 0.58.

C. One applying for a position in the Faculty of Philosophy is more easily accepted than another applying for a position in the Faculty of Economics.

D. One first-year student is selected at random. Given that the student is male, the probability that he attends the Polytechnic Faculty is 0.71.

A. B and C

B. A and C

C. A and D

D. C and D

8.

ELISA is an enzyme-based methodology that detects and measures antibodies in the blood. This methodology can be used to detect antibodies to HIV infection. The test is accurate 92.5% of the time. Cyprus has a population of $1264 \cdot 10^3$ and it is estimated that in the last year 218 people in Cyprus have been infected by the virus. A random person from Cyprus is selected and tested for antibodies with the specific test. The probability that the person is infected given that the test is negative is:

A. $1,398 \cdot 10^{-5}$

B. 0,998

C. 0,925

D. 0,075

9. Two boxes A and B contain 50 balls numbered $\{1, 2, 3, \dots, 49, 50\}$ each. From each box we randomly select one ball. The probability that the number of the ball selected from box B is less than that of the box A at least by 2 is:

A. 0,53

B. 0,45

C. 0,25

D. 0,47

10. A box contains 3 red, 6 white and 2 black balls. Red balls contain 2 euros, white balls 1 euro and black balls are empty. We choose 3 balls at random and give the red ones to Thanos and the white ones to Maria. The probability that Thanos gets more money than Maria is:

A. 0,39

B. 0,15

C. 0,61

D. 0,33



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B - Lower secondary

1 - Basic knowledge test

Version: 1 Language: en

1. The mean weight of 21 employees is 80 kg. Charalambos, Vasiliki and Loukas are among the employees. Charalambos weighs twice as much as Vasiliki and Loukas is 12 kg lighter than Charalambos. If Charalambos, Vasiliki and Loukas are removed from the group, the mean weight of the remaining employees is 79 kg. Loukas weighs:

- A. 96 kg
- B. 54 kg
- C. 110,4 kg
- D. 98,4 kg

2. A number is randomly selected from the set $A = \{10, 13, 14, 15\}$ and a number is randomly selected from the set $B = \{15, 17, 19\}$. The probability that the sum of the two numbers is a multiple of 3 is:

- A. 0,33
- B. 0,25
- C. 0,67
- D. 0,75

3.

A confectionery company manufactures colored chocolates. It sells them in a package of 200 grams. The amount of each color of chocolate in the package is not fixed. However, the probability of a random selection from each color in a 200-gram package is given in the next table.

Color	Yellow	Orange	Red	Green	Blue	Brown
Probability	0,175	0,175	0,15	x	x+0,05	x

A chocolate is chosen at random from a package. The probability that the chocolate is either blue or orange is:

- A. 0,2
- B. 0,375
- C. 0,035
- D. 0,625

4.

Two of the digits 0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 are randomly selected and placed in the empty positions of the six-digit number (each digit can be chosen twice):

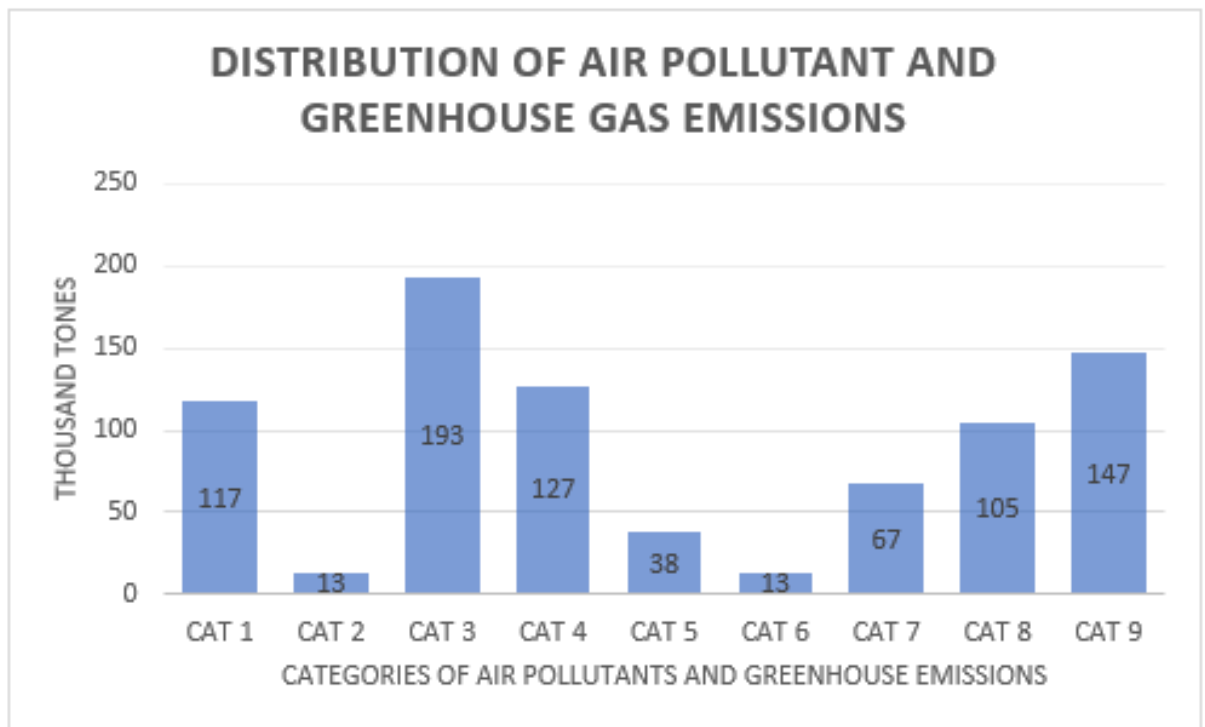
$$5 _ 9 _ 12$$

The probability that the number formed is divisible by 4 and 9 is:

- A. 0,89
- B. 0,25
- C. 0,11
- D. 0,33

5.

The bar chart shows the distribution of air pollutant and greenhouse gas emissions during the last four months of 2022 in the countries of the European Union in terms of nine pollutant categories (see table).



Categories of air pollutants and greenhouse gases	
CAT 1	Agriculture, forestry and fishing
CAT 2	Mining and quarrying
CAT 3	Manufacturing
CAT 4	Supply of electricity, gas, steam and air conditioning supply
CAT 5	Water supply, sewerage, waste management
CAT 6	Construction activities
CAT 7	Services (except transport and storage)
CAT 8	Transport and storage
CAT 9	Total household activities

If we construct a pie chart for the above data, the central angle corresponding to the "Construction activities" category is:

- A. $6,34^\circ$
- B. $1,58^\circ$
- C. $5,71^\circ$
- D. $57,07^\circ$

6. A gift is placed in one of 5 identical boxes. Marios is asked to choose a box at random. If he chooses the box containing the gift, he gets the gift and a new gift is placed in the box. If he does not choose the box with the gift, then the gift is placed back into one of the 5 boxes. Marios tries 3 times. The probability of winning exactly 2 gifts is:

- A. 0,064
- B. 0,48
- C. 0,224
- D. 0,096

7.

The following table shows the applications by faculty and by gender that were accepted (YES) or rejected (NO) by the four faculties of a university for the current academic year.

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- C. One applying for a position in the Faculty of Philosophy is more easily accepted than another applying for a position in the Faculty of Economics.
- D. One first-year student is selected at random. Given that the student is male, the probability that he attends the Polytechnic Faculty is 0.71.

- A. B and C
- B. A and C
- C. A and D
- D. C and D

8. Three teams A, B and C participate in a competition. The probability that team A will win the prize is twice the probability that team B will win it. The ratio of the probability that team B will win the competition to the probability that team C will win is 2:3. The probability that team A will win the competition is:

A. 0,44

B. 0,22

C. 0,16

D. 0,33

9. Two boxes A and B contain 50 balls numbered $\{1, 2, 3, \dots, 49, 50\}$ each. From each box we randomly select one ball. The probability that the number of the ball selected from box B is less than that of box A is:

A. 0,52

B. 0,48

C. 0,51

D. 0,49

10. There are 7 cards numbered with positive integers. Two of them have the numbers 2 and 6. The median of the numbers on the cards is 8, the mode is 2 and 10, and the mean value is 7. The numbers on the cards could be:

A. $\{2, 6, 2, 10, 10, 8, 11\}$

B. $\{2, 6, 2, 10, 10, 8, 9\}$

C. $\{2, 6, 2, 8, 10, 9, 12\}$

D. $\{2, 6, 5, 10, 10, 8, 8\}$