



# 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



# Statistics Competition 2024.

## Questionnaire checking

A - Upper secondary

1 - Basic knowledge test

Version: 2      Language: en

1.

The mean and variance of 100 values of a sample are 5 and 4 respectively. If for the 99 values,

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

The hundredth value is:

- A. 23,71 or -13,71
- B. 22,32 or -12,32
- C. 25,21 or -17,21
- D. 18,14 or -17,21

2.

Three students A, B and C independently solve an exercise with probability of correct solution  $\frac{1}{2}$ ,  $\frac{1}{4}$  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. 0,55
- B. 0,18
- C. 0,27
- D. 0,50

3.

A Ferris wheel has a diameter of 102 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. 0,33
- B. 0,85
- C. 0,67
- D. 0,69

4.

Let A and B be two events of the same sample space for which,  $P(A \cup B) = \frac{7}{12}$ , 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.  $\frac{1}{3}$
- B.  $\frac{1}{4}$
- C.  $\frac{1}{2}$
- D.  $\frac{2}{3}$

5.

Let  $A = \{\alpha_1, \alpha_2, \alpha_3, \alpha_4\}$  and  $B = \{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_6\}$  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. 0,09
- B. 0,01

- C. 0,3
- D. 0,28

**6. The mean and standard deviation of 15 numbers is 5 and 2 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. 13 and 8
- B. 8 and 4
- C. 10 and 8
- D. 13 and 11

**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 Polytechnic Faculty or the Faculty of Economics, the probability that she is a woman is 0.47.
- 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 0.34.

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

**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 97.5% 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 not infected given that the test is positive is:

- A. 0,993
- B.  $4,423 \cdot 10^{-6}$
- C. 0,975
- D. 0,025

**9. Two boxes A and B contain 40 balls numbered {1, 2, 3, ..., 39, 40} 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 3 is:**

- A. 0,55
- B. 0,75
- C. 0,33
- D. 0,45

**10. A box contains 4 red, 6 white and 1 black balls. Red balls contain 2 euros, white balls 1 euro and black balls are empty. We choose 4 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. 0,47
- B. 0,36
- C. 0,53
- D. 0,46





# Statistics Competition 2024.

## Questionnaire checking

A - Upper secondary

1 - Basic knowledge test

Version: 3      Language: en

1.

The mean and variance of 100 values of a sample are 4 and 3 respectively. If for the 99 values,

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

The hundredth value is:

- A. 21,71 or -15,71
- B. 19,14 or -9,14
- C. 19,81 or -11,81
- 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  $\frac{3}{5}$ , 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. 0,50
- B. 0,18
- C. 0,55
- D. 0,27

3.

A Ferris wheel has a diameter of 110 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. 0,71
- B. 0,85
- C. 0,29
- D. 0,69

4.

Let A and B be two events of the same sample space for which,  $P(A \cup B) = \frac{2}{3}$ , 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.  $\frac{1}{3}$
- B.  $\frac{1}{2}$
- C.  $\frac{2}{3}$
- D.  $\frac{1}{12}$

5.

Let  $A = \{\alpha_1, \alpha_2, \alpha_3\}$  and  $B = \{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_6\}$  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. 0,16
- B. 0,56

C. 0,09

D. 0,3

**6. The mean and standard deviation of 15 numbers is 4 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. 11 and 7

B. 7 and 2

C. 11 and 4

D. 8 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
Applications										
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. One applying for a position in the Faculty of Economics faculty is more easily accepted than another applying for a position in the Faculty of Science.
- B. This particular university favored applications for admission from women.
- C. One first-year student is selected at random. Given that the student studies either in Faculty of Philosophy or in the Faculty of Science, the probability that he is male is 0.42.
- 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. B and D

D. A 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 95.5% 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 not infected given that the test is positive is:

A.  $8,128 \cdot 10^{-6}$

B. 0,955

C. 0,996

D. 0,045

**9. Two boxes A and B contain 60 balls numbered  $\{1, 2, 3, \dots, 59, 60\}$  each. From each box we randomly select a ball. The probability that the number of the ball selected from box B is less than that of the box A at least by 4 is:**

A. 0,57

B. 0,43

C. 0,25

D. 0,33

**10. A box contains 4 red, 7 white and 1 black ball. Red balls contain 2 euros, white balls 1 euro and black balls are empty. We choose 4 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. 0,41

B. 0,07

C. 0,59

D. 0,32