Statistics Competition 2023.

Questionnaire checking

A - Upper secondary

1 - Basic knowledge test

Version: 1 **Language: en**

1. **A test for a statistics competition has 20 multiple-choice questions. Each question has 5 possible answers. A contestant decides to answer all the questions at random. What is the probability that the contestant answers exactly 5 questions correctly?**

A. 0,175

B. $1{,}66 \cdot 10^{-7}$

C. $1{,}26 \cdot 10^{-5}$

D. $3{,}2 \cdot 10^{-4}$

2. **Six friends agree to meet at the “Acropolis Hotel” in Athens. However, there are 4 hotels with the same name. Therefore, each of the 6 friends chooses to stay at one of them randomly. What is the probability that two of them choose different hotels and the other four are paired in the other two hotels?**

A. 0,527

B. 0,022

C. 0,088

D. 0,070

3. **A question is asked consecutively and in random order to n persons (n≥7). Suppose that exactly 3 of the n persons know the answer. What is the probability that the first four respondents do not know the answer?**

A. $\frac{\binom{n-3}{4}}{\binom{n}{4}}$

B.

$\frac{\binom{n-4}{4}}{\binom{n}{4}}$

C. $\frac{1}{\binom{n}{4}}$

D. $\frac{\binom{n}{n-3}}{\binom{n}{4}}$

4.

Four athletes compete in sharpshooting. The following table shows the results of their shots.

Athlete	Results
A	9, 8, 8, 8, 7
B	10, 10, 8, 7, 5
C	9, 9, 7, 6, 9
D	10, 6, 6, 9, 9

The jury has the following criteria to decide the winner of the competition. First, the athlete with the best shot average and second, in case of a tie, the athlete with the most consistent shots. The winner of the competition is:

A. The first

B. The second

C. The third

D. The fourth

5. **A survey is to be conducted on the impact of recent refugee flows on the local community. It is known that the percentage of people who respond to a survey is κ %. If λ % of the completed questionnaires are rejected due to incorrect completion, what should the initial sample be, as a function of κ and λ, so that the final number of correctly completed questionnaires is 1500?**

A. $\frac{150000}{100+\kappa \cdot \lambda}$

B.

$$\frac{15000000}{\lambda(100-\kappa)}$$

C. $$\frac{15000000}{\kappa(100-\lambda)}$$

D. $$\frac{150000}{\kappa+\lambda}$$

6. **An electronic plotter marks at random red and blue points on a rectangular coordinate system within the square with vertices A(-4,4), B(4,4), C(4,-4) and D(- 4,-4). The probability that the electronic plotter marks a blue point is twice that of a red one. The probability of marking a point within a region of the rectangle ABCD is the same as the probability of marking a point in any other region within a rectangle of equal area. Also, the colour of a point is independent of its position. What is the probability that the next two points marked by the electronic plotter will be in the order blue and red, and both will lie within the quadrilateral EFGH, with vertices E(1,3), F(3,3), G(4,-1) and H(1,-1)?**

A. 0,156

B. 0,005

C. 0,035

D. 0,087

7.

If A and B are two outcomes of the same sample space S, with $P(A \cup B) = \frac{7}{8}$ and $P(A \cap B) = \frac{1}{8}$ and the function,

$$f(x) = \begin{cases} \dfrac{P(A)x^2 - x + P(B)}{x-1} & , x \neq 1 \\ -4P(A-B) & , x = 1 \end{cases}$$

is continuous, then $P(B)$ is:

A. $\frac{5}{6}$

B. $\frac{1}{4}$

C. $\frac{3}{4}$

D. $\frac{1}{2}$

8.

The following observations of a sample are given:

$$7,\quad 5,\quad a,\quad 2,\quad 5,\quad b,\quad 8,\quad 6,\quad c,\quad 5,\quad 3$$

where, a, b and c are natural numbers with $a < b < c$. The mean value of the observations is 6, the median is also 6, and the range is 8. If $\alpha^2 + \beta^2 + \gamma^2 = 217$, then the value of b is:

A. 9

B. 6

C. 8

D. 7

9. **The ratio of the number of ships arriving at a port from EU member countries to the number of ships arriving at the same port from non-EU member countries is 2 to 3. The percentage of ships arriving at the port without delay is 36% . The percentage of ships arriving at the port from non-EU member countries with delay is 60%. A ship is taken randomly from those arriving at the port with delay. What is the probability that this ship comes from an EU member country is:**

A. $\frac{7}{16}$

B. $\frac{7}{10}$

C. $\frac{2}{3}$

D. $\frac{5}{8}$

10.

In a box, there are $(n-1)$, where $n \geq 7$, white balls and 1 blue ball. Balls are continuously withdrawn, one ball after another, from the box, each time without replacement, until the blue one appears. If the probability that the blue ball is drawn, at most on the 7^{th} draw is $\frac{1}{4}$, then the number of white balls in the box is:

A. 28

B. 27

C. 26

D. 29

Statistics Competition 2023.

Questionnaire checking

B - Lower secondary

1 - Basic knowledge test

Version: 1 **Language: en**

1. **George and Mary are playing a game of backgammon. Towards the end of the game, Mary notices that she needs a dice roll with a sum of outcomes more than 7 to win the game. Otherwise, George will win the game. The probability that Maria wins the game is:**

A. 0,42

B. 0,58

C. 0,25

D. 0,5

2.

A. 0,29

B. 0,86

C. 0,67

D. 0,38

3. **A box contains 5 blue balls, numbered from 1 to 5, and 4 yellow balls, numbered from 1 to 4. We take at random 2 balls from the box simultaneously. The probability that both balls are odd-numbered is:**

A.

B.

C. $\frac{1}{6}$

D. $\frac{5}{9}$

4.

The following table shows the percentage of the population aged 25-64 in Cyprus and the rest of the Euro-countries who know two foreign languages well.

	2007	2011	2016
Rest of Euro-countries	20.1	21.2	23.1
Cyprus	17.9	19.2	20.3

The percentage increase in the percentage of citizens in Cyprus who know two foreign languages between the years 2007 and 2016 is:

A. 13,41%

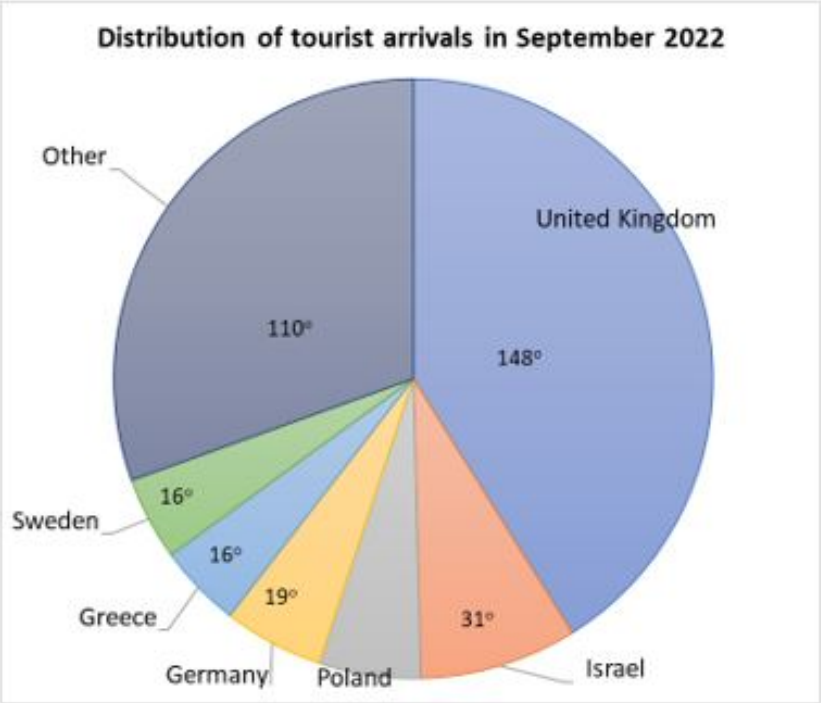
B. 5,73%

C. 1,1%

D. 2,4%

5.

The pie chart below shows the distribution of tourist arrivals in Cyprus in September 2022.



The total number of tourists in September was 413382. If we convert the pie chart into a frequency bar chart, the height of the bar corresponding to arrivals from Poland is:

A. 5,5%

B. 82676

C. 22966

D. 82676,4

6. In a yard, there are 64 white, black and grey rabbits. Blacks are twice as many as whites. The average age of all rabbits is 1,2 years. The average age of white rabbits is 1,1 years. The average age of black rabbits is 0,9 years, and that of grey rabbits is 1,5 years. The population of grey rabbits is:

A. 24

B. 28

C. 12

D. 27

7. A survey on the effects on Cypriots from the continuous flow of immigrants to the island is to be carried out using a self-response questionnaire. Recent surveys show that the percentage of those who are not willing to participate in any survey is 30%. Also, 15% of the completed questionnaires are rejected as not being filled in correctly. What should the initial sample be for this survey so that the final number

of correctly completed questionnaires is 1500?

A. 14286

B. 33333

C. 5882

D. 2521

8.

According to data held by the Cyprus Police, the distribution of severe crimes against property, by type and value of the stolen property, in 2018 was as follows:

	VALUE OF STOLEN ITEMS			
TYPE	Up to €5000	Over €5000	Not declared	Total
Valuables	185	133	20	338
Electronics/Electrical	214	19	6	239
Motorized	57	22	7	86
Amount of money	290	72	39	401
Tools	57	13	1	71
Other	343	100	37	480
Total	1146	359	110	1615

If we choose, at random, a severe property crime case and given that the value of the stolen property was either in the "Not declared" category or in the "Up to 5000" category, what is the probability that this crime belongs to the category “Amount of money”?

A. 0,608

B. 0,262

C. 0,820

D. 0,204

9. Two numbers are chosen simultaneously, at random, from the set A={1, 2, 3, 4, 5}. What is the probability that the product of these numbers increased by 1 is divisible by 3 and not by 2?

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\frac{1}{5}$

D. $\frac{3}{10}$

10.

If the number $\frac{x}{4}$ is an even natural number and $x \leq 16$, then the median of the observations,

$$\mathbf{4, 6, 10, 12, 8, 14, 16, 18, x, \frac{x}{4}}$$

for each possible value of x is:

A. 8

B. 9 or 11

C. 10

D. 10 or 12