

EUROPEAN STATISTICS COMPETITION 2019-20

TEST 1 – HIGHER SECONDARY

Version 1

**EXERCISE 1**

Television viewing rates of the “Masterchef 3” finals, last May, reached 33%. A survey company conducted a telephone survey the next day, looking for viewers of the contest among the public. Each researcher had to reach a specific number of questionnaires by viewers of the contest. Towards the end of the day, George, who works for the survey company, found that he needed only one more questionnaire to reach his goal. What is the probability that he will reach his goal by making less than seven phone calls? (Assume that all respondents answered the telephone questionnaire).



**Answer:**

- A.** 0,91                      **B.** 0,94                      **Г.** 0,03                      **Δ.** 0,02

**EXERCISE 2**

The following table shows 7 pairs of observations from two variables of a population. What is the relationship between the two variables?

<i>x</i>	2	1	6	6	8	9	7
<i>y</i>	1	3	4	7	7	9	8

**Answer:**

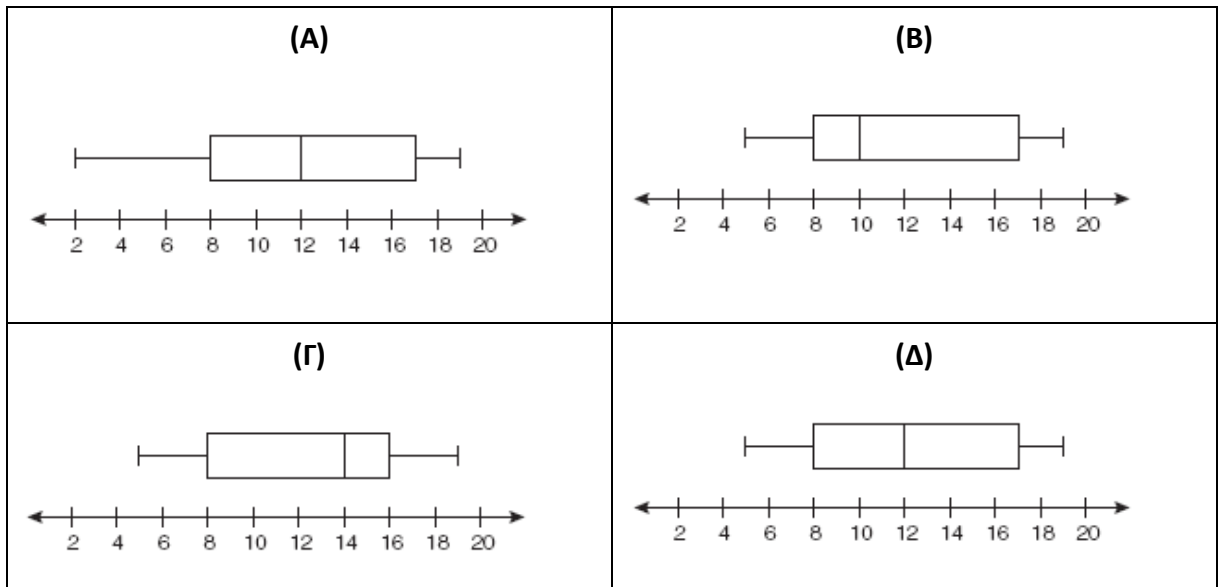
- A.** No relation  
 $r_{xy} \cong 0$
- B.** strong positive correlation  
 $r_{xy} > 0,8$
- Г.** positive correlation  
 $0,7 < r_{xy} < 0,8$
- Δ.** weak correlation  
 $|r_{xy}| < 0,7$

**EXERCISE 3**

Jacob is saving a portion of his weekly earnings in the hope of buying a new bike. Below are his economies, in euros, for the last 15 weeks.

19	12	9	7	17	10	6	18	9	14	19	8	5	17	9
----	----	---	---	----	----	---	----	---	----	----	---	---	----	---

Which of the box-plots describes these data?



**Answer:**

- A. (A)      **B. (B)**      Γ. (Γ)      Δ. (Δ)

**EXERCISE 4**

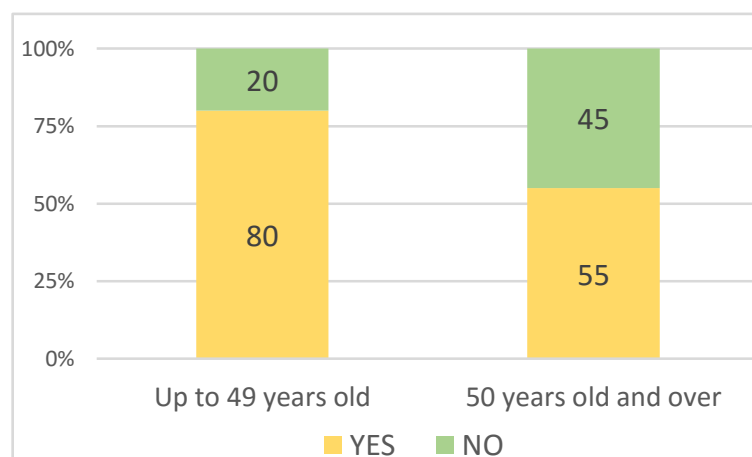
The probability that a natural number from 1 to 200 000 is a multiple of 30 and cannot be divided by 18 is:

**Answer:**

- A. 0,027775      **B. 0,02222**      Γ. 0,022225      Δ. 0,02778

**EXERCISE 5**

In a survey a sample of citizens is asked whether they use the internet daily. The following graph shows the results between two age groups, respondents up to 49 years old and those 50 years old and over.



In the survey, 70% of respondents use the internet. The percentage of people up to 49 years who participated in the survey is:

**Answer:**

- A. 60%                      B. 70%                      Γ. 80%                      Δ. 90%

### EXERCISE 6

How many times does one need to roll a fair die, in order to have that the probability of obtaining a number less than 3 at least once, is equal to  $\frac{211}{243}$  ?

**Answer:**

- A. 9                       B. 5                      Γ. 27                      Δ. 81

### EXERCISE 7

Consider the closed subset of real numbers  $A = [0, 50]$ . We randomly select a number from the set A. What is the probability that the number is greater than 20 and less than 32?

**Answer:**

- A. 0,24                      B. 0,22                      Γ. 0,26                      Δ. 0,76

### EXERCISE 8

A school assistant found five school bags and five jerseys in the gym. She placed the five jerseys, at random upon the five bags. What is the probability that at least three jerseys were correctly paired with the right school bags?

**Answer:**

- A.  $\frac{11}{120}$                       B.  $\frac{2}{15}$                       Γ.  $\frac{1}{8}$                       Δ.  $\frac{1}{20}$

### EXERCISE 9

The ratio of the number of women to the number of men, employed in a certain factory, is 3:2. A percentage of 5% of men and 2% of women are willing to work overtime. An employee, from the group of those who are willing to work overtime, is chosen at random. What is the probability of this person being a man?

**Answer:**

A.  $\frac{1}{50}$

B.  $\frac{15}{19}$

**Г.**  $\frac{5}{8}$

Δ.  $\frac{3}{8}$

**EXERCISE 10**

Two samples A and B are defined as follows: Sample A:  $x_1, x_2, x_3, \dots, x_\nu$  and sample B:  $\kappa \cdot x_1, \kappa \cdot x_2, \kappa \cdot x_3, \dots, \kappa \cdot x_\nu$ , where  $\kappa$  is a constant real number. If  $S_A$  and  $S_B$  are the standard deviations of samples A and B respectively, then the ratio  $\frac{S_B}{S_A}$  is equal to:

**Answer:**

**А.**  $|k|$

B.  $\frac{1}{|k|}$

Г.  $\frac{1}{k^2}$

Δ.  $k^2$

**Version 2**

**EXERCISE 1**

Television viewing rates of the “Masterchef 3” finals, last May, reached 31%. A survey company conducted a telephone survey the next day among the viewers of the contest. Each researcher had to reach a specific number of questionnaires by viewers of the contest. Towards the end of the day, George, who works for the survey company, found that he needed only one more questionnaire to reach his goal. What is the probability that he will reach his goal by making less than seven phone calls? (Assume that all respondents answered the telephone questionnaire).



**Answer:**

- A.** 0,89                      **B.** 0,026                      **Γ.** 0,033                      **Δ.** 0,93

**EXERCISE 2**

The following table shows 7 pairs of observations from two variables of a population. What is the relationship between the two variables?

<i>x</i>	2	1	6	6	8	9	7
<i>y</i>	1	3	3	7	4	9	8

**Answer:**

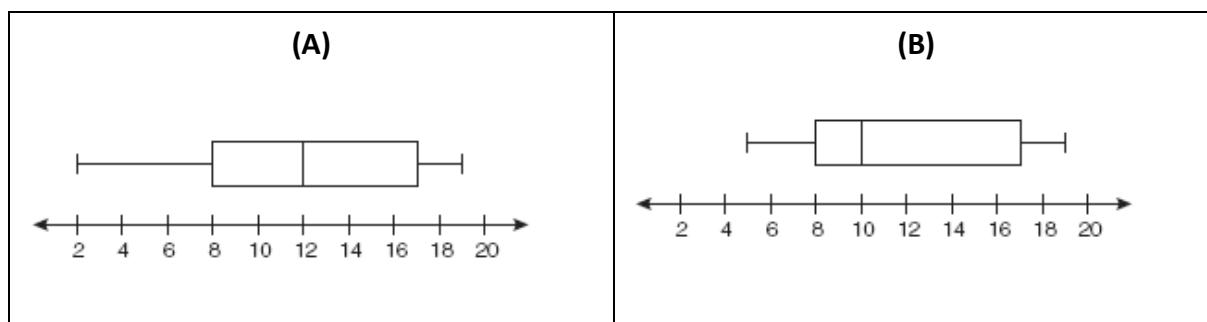
- A.** *No relation*  
 $r_{xy} \cong 0$
- B.** *strong positive correlation*  
 $r_{xy} > 0,8$
- Γ.** *positive correlation*  
 $0,7 < r_{xy} < 0,8$
- Δ.** *weak correlation*  
 $|r_{xy}| < 0,7$

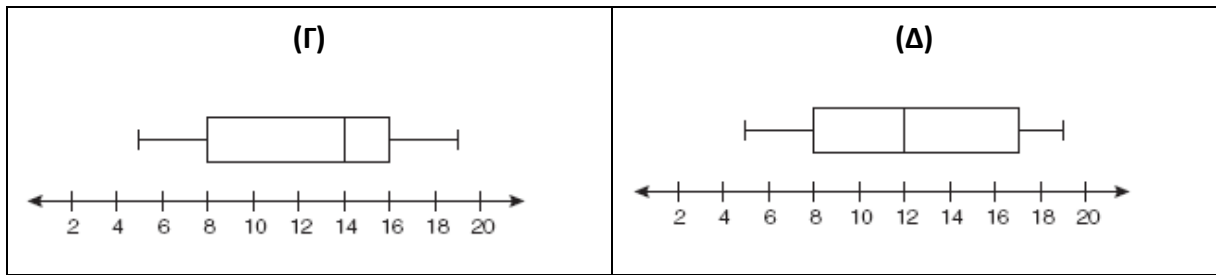
**EXERCISE 3**

Jacob is saving a portion of his weekly earnings in the hope of buying a new bike. Below are his economies, in euros, for the last 15 weeks.

19	15	11	7	14	10	6	18	14	14	17	8	5	16	9
----	----	----	---	----	----	---	----	----	----	----	---	---	----	---

Which of the box-plots describes these data?





**Answer:**

- A. (A)      B. (B)      **Γ. (Γ)**      Δ. (Δ)

**EXERCISE 4**

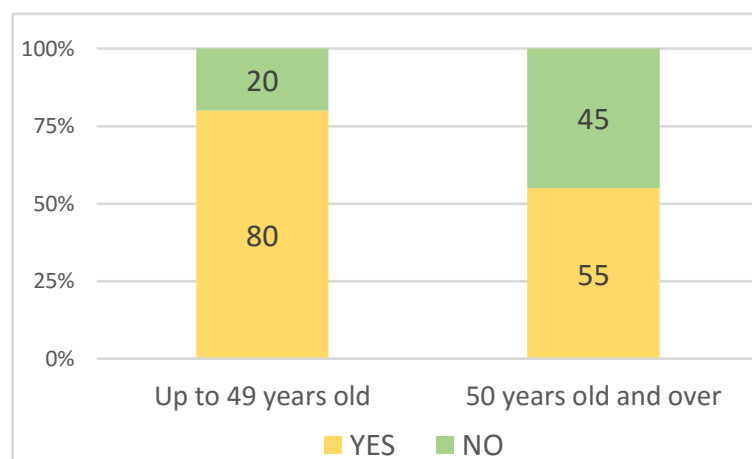
The probability that a natural number from 1 to 200 000 is a multiple of 30 and cannot be divided by 21 is:

**Answer:**

- A. 0.03175      B. 0.031745      **Γ. 0.02857**      Δ. 0.028575

**EXERCISE 5**

In a survey a sample of citizens is asked whether they use the internet daily. The following graph shows the results between two age groups, respondents up to 49 years old and those 50 years old and over.



In the survey, 65% of respondents use the internet. The percentage of people up to 49 years who participated in the survey is:

**Answer:**

A. 80%

B. 75%

Γ. 65%

Δ. 40%

### EXERCISE 6

How many times does one need to roll a fair die, in order to have that the probability of obtaining a number greater than 4, at least once, is equal to  $\frac{211}{243}$  ?

Answer:

A. 27

B. 9

Γ. 5

Δ. 81

### EXERCISE 7

Consider the closed subset of real numbers  $A = [0, 50]$ . We randomly select a number from the set A. What is the probability that the number is greater than 22 and less than 34?

Answer:

A. 0,12

B. 0,16

Γ. 0,75

Δ. 0,24

### EXERCISE 8

A school assistant found six school bags and six jerseys in the gym. She placed the six jerseys, at random upon the six bags. What is the probability that at least four jerseys were correctly paired with the right school bags?

Answer:

A.  $\frac{7}{720}$

B.  $\frac{7}{240}$

Γ.  $\frac{11}{360}$

Δ.  $\frac{1}{45}$

### EXERCISE 9

The ratio of the number of women to the number of men, employed in a certain factory, is 5:3. A percentage of 5% of men and 2% of women are willing to work overtime. An employee, from the group of those who are willing to work overtime, is chosen at random. What is the probability of this person being a man?

Answer:

A.  $\frac{2}{7}$

B.  $\frac{3}{160}$

Γ.  $\frac{3}{5}$

Δ.  $\frac{2}{5}$

### EXERCISE 10

Two samples A and B are defined as follows: Sample A:  $x_1, x_2, x_3, \dots, x_n$  and sample B:  $\lambda \cdot x_1, \lambda \cdot x_2, \lambda \cdot x_3, \dots, \lambda \cdot x_n$ , where  $\lambda$  is a constant real number. If  $S_A$  and  $S_B$  are the standard deviations of samples A and B respectively, then the ratio  $\frac{S_B}{S_A}$  is equal to:

**Answer:**

**A.**  $|\lambda|$

**B.**  $\frac{1}{|\lambda|}$

**Г.**  $\frac{1}{\lambda^2}$

**Δ.**  $\lambda^2$



### Version 3

#### EXERCISE 1

Television viewing rates of the “Masterchef 3” finals, last May, reached 35%. A survey company conducted a telephone survey the next day among the viewers of contest. Each researcher had to reach a specific number of questionnaires by viewers of the contest. Towards the end of the day, George, who works for the survey company, found that he needed only one more questionnaire to reach his goal. What is the probability that he will reach his goal by making less than seven phone calls? (Assume that all respondents answered the telephone questionnaire).



**Answer:**

- A.** 0,92                      **B.** 0,02                      **Γ.** 0,03                      **Δ.** 0,95

#### EXERCISE 2

The following table shows 7 pairs of observations from two variables of a population. What is the relationship between the two variables?

$x$	2	1	3	8	4	9	4
$y$	7	9	8	1	7	3	6

**Answer:**

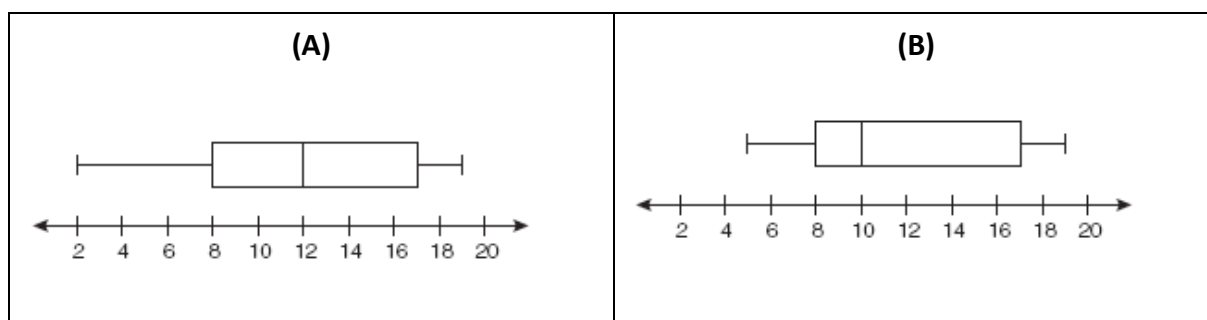
- A.** strong negative correlation  $r_{xy} < -0,8$                       **B.** No relation  $r_{xy} \cong 0$                       **Γ.** negative correlation  $-0,8 < r_{xy} < -0,7$                       **Δ.** weak correlation  $|r_{xy}| < 0,7$

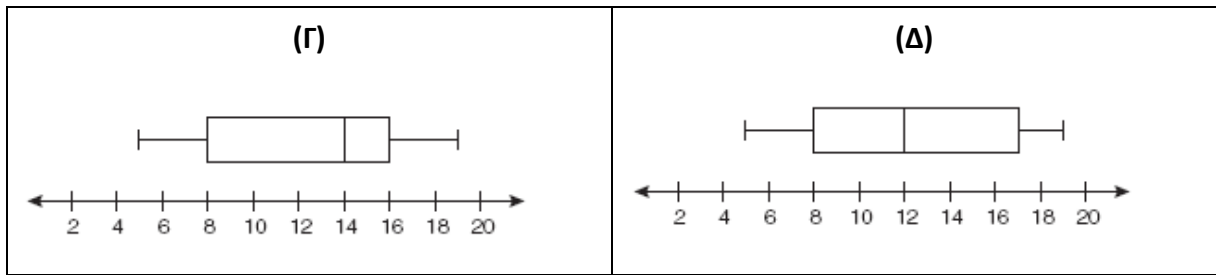
#### EXERCISE 3

Jacob is saving a portion of his weekly earnings in the hope of buying a new bike. Below are his economies, in euros, for the last 15 weeks.

19	12	9	13	17	10	6	18	8	14	19	8	5	17	9
----	----	---	----	----	----	---	----	---	----	----	---	---	----	---

Which of the box-plots describes these data?





**Answer:**

- A. (A)                      B. (B)                      Γ. (Γ)                      Δ. (Δ)

**EXERCISE 4**

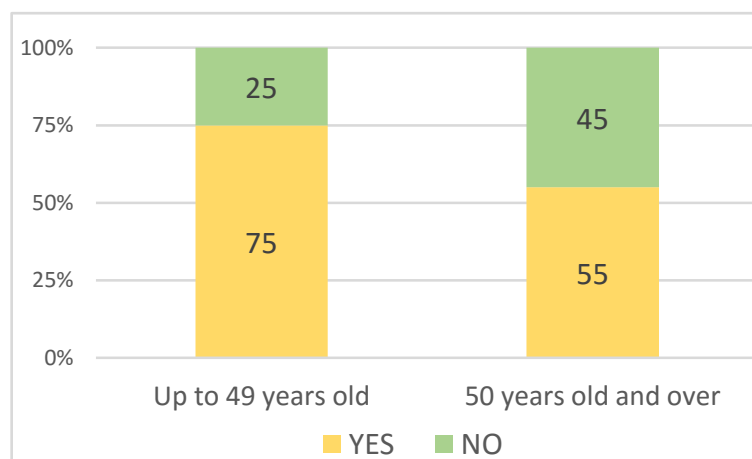
The probability that a natural number from 1 to 200 000 is a multiple of 30 and cannot be divided by 12 is:

**Answer:**

- A. 0.03056                      B. 0.030555                      Γ. 0.01667                      Δ. 0.016665

**EXERCISE 5**

In a survey a sample of citizens is asked whether they use the internet daily. The following graph shows the results between two age groups, respondents up to 49 years old and those 50 years old and over.



In the survey, 65% of respondents use the internet. The percentage of people up to 49 years who participated in the survey is:

**Answer:**

- A. 75%                      B. 60%                      Γ. 55%                      Δ. 50%

### EXERCISE 6

How many times does one need to roll a fair die, in order to have that the probability of obtaining a number greater than 5 or less than 2, at least once, is equal to  $\frac{211}{243}$  ?

Answer:

- A. 27                      B. 9                      Γ. 81                      Δ. 5

### EXERCISE 7

Consider the closed subset of real numbers  $A = [0, 50]$ . We randomly select a number from the set A. What is the probability that the number is greater than 27 and less than 39?

Answer:

- A. 0,12                      B. 0,26                      Γ. 0,24                      Δ. 0,76

### EXERCISE 8

A school assistant found seven school bags and seven jerseys in the gym. She placed the seven jerseys, at random upon the seven bags. What is the probability that at least five jerseys were correctly paired with the right school bags?

Answer:

- A.  $\frac{1}{630}$                       B.  $\frac{11}{2520}$                       Γ.  $\frac{29}{5040}$                       Δ.  $\frac{1}{180}$

### EXERCISE 9

The ratio of the number of women to the number of men, employed in a certain factory, is 2:3. A percentage of 5% of men and 2% of women are willing to work overtime. An employee, from the group of those who are willing to work overtime, is chosen at random. What is the probability of this person being a man?

Answer:

- A.  $\frac{2}{3}$                       B.  $\frac{3}{20}$                       Γ.  $\frac{15}{19}$                       Δ.  $\frac{4}{19}$

### EXERCISE 10

Two samples A and B are defined as follows: Sample A:  $x_1, x_2, x_3, \dots, x_n$  and sample B:  $\mu \cdot x_1, \mu \cdot x_2, \mu \cdot x_3, \dots, \mu \cdot x_n$ , where  $\mu$  is a constant real number. If  $S_A$  and  $S_B$  are the standard deviations of samples A and B respectively, then the ratio  $\frac{S_A}{S_B}$  is equal to:

Answer:

A.  $|\mu|$

**B.**  $\frac{1}{|\mu|}$

Г.  $\frac{1}{\mu^2}$

Δ.  $\mu^2$