

# Workbook



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# Multiple Choice Exercises

## Multiple Choice Exercises

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### Questions

Questions: 1-4 refer to the following:

Psychologists observed the behavior of 28 kindergarten children for a week. They then had to report on the level of self-confidence of each child on a scale of 1 to 5, where 5 is a high level of self-confidence and 1 a low level of self-confidence.

Self Confidence	Number of Children
1	6
2	7
3	10
4	4
5	1

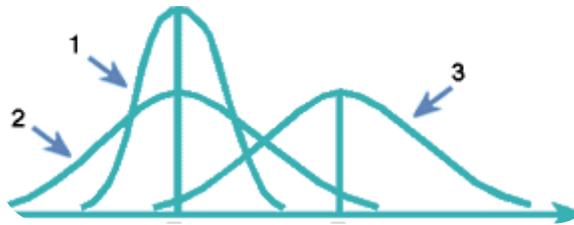
The following table displays the results:

- 1) What is the measuring scale of the variable involved?
  - a. Nominal
  - b. Ordinal
  - c. Interval
  - d. Divisible
  
- 2) What is the most suitable way of displaying the data graphically?
  - a. Frequency table
  - b. Bar graph
  - c. Histogram
  - d. Pie graph
  
- 3) What is the mode of the probability distribution of the data collected?
  - a. 2
  - b. 1
  - c. 3
  - d. 10

- 4) Another child is added with a low level of self-confidence. As a result, the standard deviation of the variable involved will:
- Increase
  - Decrease
  - Remain unchanged
  - The information is insufficient to draw a conclusion.
- 5) If we want to examine whether an employee's origin (Asia, Europe, Africa, America) affects his education (in years), we will do it using:
- The linear measure of association
  - A joint frequency table
  - A boxplot
  - A dispersion diagram

Questions: 6-10 refer to the following:

The following diagram displays three normal probability distributions of three different groups drawn on a system of coordinate axes. The probability distributions have been numbered in order to distinguish between them.



- 6) Which probability distribution has the highest average?
- 1
  - 2
  - 3
  - The information is insufficient to determine the answer.
- 7) Which probability distribution has the highest mode?
- 1
  - 2
  - 3
  - The information is insufficient to determine the answer.

- 8) How are probability distributions 1 and 2 alike?
- They have the same top decile.
  - They have the same average.
  - They have the same variance.
  - None of the above answers is correct.
- 9) Which of the following sentences is correct for probability distribution no. 3?
- The average of the probability distribution is equal to its median.
  - The range of the probability distribution is equal to the inter-quartile range.
  - The bottom decile is equal to the top decile.
  - The standard deviation is zero.
- 10) Which of the probability distributions has the smallest standard deviation?
- 1
  - 2
  - 3
  - The information is insufficient to determine the answer.

Questions: 11-15 refer to the following:

A merchant decides to give a 20% discount on all the products in his store.

$X$  is the price in dollars of the product before the discount, and  $Y$  is the price in dollars of the product after the discount. The merchant calculated the following measures before the discount:

Average	80
Median	70
Variance	300
Range	48

He also calculated all the measures for  $Y$ .

- 11)** What is the average of the prices in dollars after the discount?
- 16
  - 64
  - 80
  - 70
- 12)** What is the range of the prices in dollars after the discount?
- 9.6
  - 38.4
  - 48
  - 70
- 13)** What is the variance of the prices after the discount?
- 300
  - 60
  - 240
  - 192
- 14)** What is the coefficient of variance ( $CV$ ) of the prices before the discount?
- 3.75
  - 0.267
  - 0.2165
  - 4.619
- 15)** If the merchant calculates the correlation coefficient of  $X$  and  $Y$ , the result will be:
- 0
  - 1
  - 1
  - The information is insufficient to determine the answer.

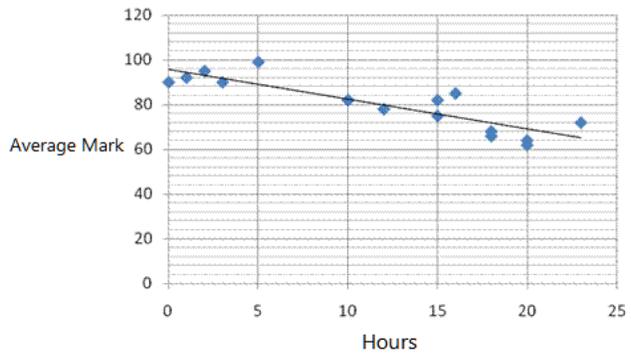
- 16)** In a right asymmetric probability distribution, the standard deviation is greater than in a left asymmetric probability distribution.
- The statement is always correct.
  - The statement is never correct.
  - The information is insufficient to determine the answer.
- 17)** On the numbers axis, most of the values in a right asymmetric probability distribution are:
- High values
  - Equally distributed between high and low values
  - Low values
  - The information is insufficient to determine the answer.
- 18)** Adding a constant to all the observations in a series of data:
- Will increase the standard deviation
  - Will decrease the standard deviation
  - Will not change the standard deviation
  - The information is insufficient to determine the answer.

Questions: 19-21 refer to the following:

A researcher wants to discover the connection between the number of hours per week that a student spends on entertainment and his average mark at the end of the semester.

For this purpose, he collected data from 15 students and used the Excel program to create a scatter plot.

The researcher added to the diagram the trend line suitable for the data.



- 19) Which is the independent variable?
- The average mark
  - The number of hours spend on entertainment
  - The number of students
- 20) What can be said about the relationship between the number of hours per week spent on entertainment and the average mark in the semester?  
(Your answer should be based on the data and not on your personal opinion)
- If more hours are spent on entertainment, the mark tends to decrease.
  - There is no connection between the hours spent on entertainment and the mark.
  - If fewer hours are spent on entertainment, the mark tends to decrease.
  - If the mark decreases, the student tends to spend fewer hours on entertainment.
- 21) Which of the following correlations is the best description for the connection between the two variables?
- 0.85
  - 0.15
  - 0.85
  - 0.15
- 22) The standard deviation of a certain variable  $X$  was 2.  
It was decided to transform the variable according to the following formula:  $Y = 3X - 2$ .  
The variation of  $Y$  after the transformation is:
- 4
  - 6
  - 10
  - 12
  - 36

Questions: 23-25 refer to the following:

30 students in a course are tested in English and statistics.  
The following table displays the output for the marks:

	English	Statistics
Average	90	80
Variance	121	100

- 23)** In which subject does the probability distribution of the marks have a greater dispersion?
- English
  - Statistics
  - Both subjects have the same relative dispersion
  - The information is insufficient to determine the answer
- 24)** Yaara got 92 in English and 82 in statistics.  
In which subject did she get the better mark in comparison with her class?
- English
  - Statistics
  - The marks were relatively the same
  - The information is insufficient to determine the answer
- 25)** Oded, who got an 80 in statistics, cheated on the exam by copying his answers.  
It is decided to recalculate the variance of the marks in statistics without him.  
The new variance:
- Will decrease
  - Will increase
  - Will not change
  - The information is insufficient to determine the answer
- 26)** The inter-quartile range was calculated for a certain probability distribution, and the result was zero.  
It can therefore be concluded that:
- At least 50% of the observations are the same
  - The standard deviation is zero
  - The probability distribution is asymmetric
  - This situation is impossible

- 27)** The probability distribution for a certain variable is given.
- The range of the highest 20% of the observations is equal to the range of the lowest 20% of the observations
  - The range of the middle 50% of the observations is the inter-quartile range
  - The upper quartile equals the lower quartile
  - The inter-quartile range is half of the range

The following data are for Questions: 28-29

A researcher wishes to explore the linear connection between the mark on an optional statistics and finance exam and the number of hours' students spent studying for the exam. A sample of 100 students was taken and the following results were recorded: the average mark of the students was 65, with a standard deviation of 27. The average number of hours spent studying for the exam was 30, with a standard deviation of 18. The correlation coefficient between the mark and the number of hours spent studying was 0.8.

- 28)** According to the regression equation, an additional hour of studying improves the mark on the exam by:
- 1.5 points
  - 0.53 points
  - 0.66 points
  - 1.20 points
  - 0.96 points
- 29)** According to the regression equation, a student taking the exam without studying for it at all will receive a mark of:
- 29
  - 0
  - 33
  - 24
  - 26
- 30)** If the correlation coefficient between two variables is negative, then:
- The values of the variables are negative.
  - As one variable increases, the other increases.
  - As one variable decreases, the other decreases
  - There is a negative linear transformation between the two variables.
  - None of the answers is correct.

- 31)** An investment portfolio contains 10 shares.  
Assuming that the shares are independent of each other and the chances of a given share rising are 0.6, what is the standard deviation of the number of shares that will rise on a given day?
- 6
  - 4
  - 1.55
  - 2.46
- 32)** Kathy, a famous statistician, claims that when events  $E$  and  $F$  are mutually exclusive, it can be said that the probability that both event  $E$  and event  $F$  will occur, equals to the product of the probability that  $E$  will occur and the probability that  $F$  will occur. In mathematical language:  $P(E \cap F) = P(E) \times P(F)$ .
- Is Kathy's claim correct?
- The information is insufficient to determine the answer.
  - No
  - Yes
  - The term "mutually exclusive events" does not exist in statistics.
  - None of the answers are correct.
- 33)** As the center of a normal probability becomes steeper and narrower
- The larger is its variance
  - The larger is its average
  - It represents taller people
  - The lower is its variance
  - The larger is its median
- 34)** Given a series of  $n$  measurements, where not all of the values are identical. Assume that two measurements are added to the series, both of which are identical to the average of the series.
- Will adding the two new values change the variance of the series? And if so, how will it change?
- The variance of the series will decrease.
  - The variance of the series will increase.
  - The information is insufficient to draw a conclusion; it depends on the number of observations.
  - The information is insufficient to draw a conclusion; it depends on the value of the average.

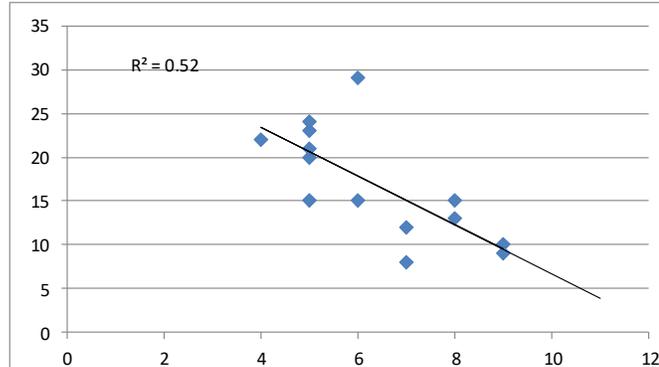
- 35)** The average employee level of seniority (in years) in a certain factory is 12 years, with standard deviation of 8 years. After three more years, if all the employees continue working at the factory and no new employees are added, we can conclude that:
- The average is 15 years and the standard deviation is 8 years.
  - The average is 12 years and the standard deviation is 11 years.
  - The average is 15 years and the standard deviation is 11 years.
  - The average is 12 years and the standard deviation is 8 years.
- 36)** Two students left the economics department. Each of the students' mark was equal to the average mark of all of the students in the department. How will their leaving affect the average and variance of the remaining students if the average before they left was 80 and the variance was 100?
- The average will not change and the variance will increase.
  - The average will not change and the variance will decrease.
  - The average will not change and the variance will not change.
  - The average will decrease and the variance will increase.
  - The average will increase, and the variance will decrease.
- 37)** The median of a certain series of data is 90. Two observations are added: 100 and 20. The median will:
- Decrease
  - Increase
  - Not change
  - The information is insufficient to determine the answer
- 38)** The standard deviation of salaries in a company is \$3,000 .  
If the salary of every employee is raised by \$200 :
- The standard deviation will increase, but the information is insufficient to determine by how much.
  - The standard deviation will increase by \$200 .
  - The standard deviation will not change.
  - The standard deviation will decrease.
  - The information is insufficient to determine the answer.
- 39)** There are five shares in an investment portfolio.  
We define an event: none of the shares in the portfolio goes up tomorrow.  
Assume that a share can only rise or fall.  
The complementary event of this event is:
- At least one share rises.
  - At least one share falls.
  - All the shares rise.
  - Exactly one share rises.

- 40)** The average of a data series is 50 and the standard deviation is 10.  
If two observations of 50 each are added, the standard deviation will:
- Decrease
  - Increase
  - Not change
  - The information is insufficient to determine the answer.
- 41)** In an asymmetric probability distribution with a right tail, the standard score of the lower quartile will be:
- Necessarily negative.
  - Necessarily positive.
  - Zero
  - The information is insufficient to determine the answer.
- 42)** If the variance of a variable equals zero, what can be said about the variable?
- It increases.
  - It decreases.
  - It is a constant.
  - It is normal.
  - The information is insufficient to determine the answer.
- 43)** Given a variable  $W$  with a variance of 10.  
What will the variance be if we multiply the values of the variable  $W$  by 2?
- 20
  - 10
  - 400
  - 40
  - 0
- 44)** A positive correlation coefficient was found between the mark in English and the mark in arithmetic on an exam, therefore:
- This indicates that the marks in the class were positive.
  - As a student's mark in arithmetic decreases, his mark in English tends to decrease.
  - As a student's mark in arithmetic increases, his mark in English tends to decrease.
  - None of the answers is correct.
- 45)** Given two events, where  $P(A) = 0.45$  ,  $P(B) = 0.5$  ,  $P(A \cup B) = 0.95$ .  
Which statement about the events is correct?
- The events are independent.
  - The events are mutually exclusive.
  - Event  $B$  contains Event  $A$  .
  - The events are complementary.

Questions: 46-48 refer to the following:

The following graph is a cluster plot of two variables:  $X$  (the independent variable on the horizontal axis) and  $Y$  (the dependent variable on the vertical axis).

A regression line is drawn, and the square of the correlation coefficient was calculated.



- 46) Given the data appearing in the diagram, which of the following values describes the correlation coefficient best?
- 0.52
  - 0.52
  - 0.72
  - 0.72
- 47) What is the result for parameter  $b$  in the regression?
- 0.52
  - 2.79
  - 2.79
  - 0.52
- 48) What is the range of the probability distribution of the observations of  $X$ , the independent variable?
- 5
  - 12
  - 6.5
  - 7

Questions: 49-51 refer to the following

In a factory that manufactures car batteries, the daily output (the number of batteries in hundreds) and the number of employees who worked that day were examined for 40 days. The following table summarizes the information collected about the two variables:

	Output	No. of Employees
Average	48	15
Standard deviation	10	2

- 49)** Which of the following statements is correct?
- The maximum number of employees at the factory is 17 employees.
  - The total output during these 40 days was 192,000 batteries.
  - The range of the output of batteries is 20.
  - None of the statements is correct.
- 50)** According to the coefficient of variance ( CV ) criterion:
- The dispersion is relatively equal between the daily output and the number of employees working on a day.
  - The dispersion is relatively greater for the daily output than for the number of employees working on a day.
  - The dispersion is relatively greater for the number of employees working on a day than for the daily output.
  - There is insufficient data for calculating the CV .
- 51)** On one of the days on which output was examined, 13 employees came to work and produced 5,000 batteries.  
Which is more exceptional on that day, compared with the days checked: the output, or the number of employees?
- Exceptional to the same degree.
  - The number of employees.
  - The output.
  - The information is insufficient to determine the answer.
- 52)** The probability distribution of marks on a given exam is symmetric, therefore:
- The standard deviation of the marks is zero.
  - The median mark is equal to the average mark.
  - The upper 10<sup>th</sup> percentile (90<sup>th</sup> percentile) of the marks is equal to the bottom 10<sup>th</sup> percentile (10<sup>th</sup> percentile).
  - None of the answers is correct.

- 53) The correlation coefficient between income and spending of 10 families is calculated, and found to be 0.73. If the entire population's income is increased by 5% , and its spending is increased by 7% , then the correlation coefficient between the new income and the new spending of the 10 families:
- Will not change, and will remain 0.7
  - Will become -0.7
  - There is not enough information to calculate the correlation coefficient.
  - Only the correlation coefficient of the entire population can be calculated.
  - Between -0.7 and 0.7
- 54) Which of the following sentences is incorrect?
- If a constant is added to observations, this will not affect the dispersion of the data.
  - In a symmetric probability, the average is equal to the mode.
  - If all the observations are the same, the standard deviation is necessarily zero.
  - Multiplication by a constant changes the standard deviation.
- 55) Which of the following sentences is correct?
- The inter-quartile range is zero only if all the observations are the same.
  - In a symmetric probability distribution, the upper quartile is equal to the lower quartile.
  - In a symmetric probability distribution, the median is equal to the average.
  - 90% of the observations are found above the 90<sup>th</sup> percentile.
- 56) We want to find the chances of a union of two events.  
The probabilities of the two events can be added for this purpose only if the events are:
- Mutually exclusive
  - Not mutually exclusive
  - Dependent
  - Independent
- 57) In a carwash business, the time taken to wash a car has a normal probability distribution with an expectation of 25 minutes and a standard deviation of 5 minutes.  
The price of a carwash is \$40 if the time taken to wash a car is up to 25 minutes.  
If the time taken to wash a car is 25 minutes or more, the price is only \$20 .  
Joe put his car into the carwash. What is the expected price that Joe has to pay?
- \$30
  - \$32.50
  - \$35
  - \$24
  - The question cannot be answered without additional information.

- 58)** Multiplying all the observations in a data series by a constant:
- Will increase the standard deviation.
  - Will decrease the standard deviation.
  - Will not change the standard deviation.
  - The information is insufficient to determine the answer.
- 59)** In the city of Venice, the monthly quantity of rain falling during the summer has a normal probability distribution with an expectation of 10mm and a standard deviation of 2mm, and the monthly quantity of rain falling during the winter has a normal probability distribution with an expectation of 10mm and a standard deviation of 3mm .
- When are the chances greater that over 12mm of rain will fall?
  - In the summer
  - In the winter
  - The chances are equal
  - The information is insufficient to determine the answer.
- 60)** In a probability distribution in which the 40<sup>th</sup> percentile is equal to the average, the standard score of the average is:
- Positive
  - Negative
  - Zero
  - The information is insufficient to determine the answer.

**Answer Key**

1)	b	11)	b	21)	c	31)	c	41)	a	51)	b
2)	b	12)	b	22)	e	32)	b	42)	c	52)	b
3)	c	13)	d	23)	b	33)	d	43)	d	53)	a
4)	a	14)	c	24)	b	34)	a	44)	b	54)	b
5)	c	15)	b	25)	b	35)	a	45)	b	55)	c
6)	c	16)	c	26)	a	36)	a	46)	c	56)	a
7)	c	17)	c	27)	b	37)	c	47)	c	57)	a
8)	b	18)	c	28)	d	38)	c	48)	a	58)	d
9)	a	19)	b	29)	a	39)	a	49)	b	59)	b
10)	a	20)	a	30)	e	40)	a	50)	b	60)	c