Lecturer Statistics (BPS-17) — 2024 · Solved Past Paper

Body: Sindh Public Service Commission (SPSC) · **Post:** Lecturer Statistics (BPS-17) · **Year:** 2024 · **Questions:** 50 in the original paper — **49 solved and verified**, 1 excluded as defective (Q31) · **Price:** Free

> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click “Why each option?” under a question to see all four options explained — one question teaches four topics. General Knowledge answers are as of the 2024 sitting.

Source note: testpointpk reproduction, 'SPSC Lecturer Statistics Past Paper 24-04-2024' (50 stems, 4–5 options and a printed key, paginated; direct-curl raw HTML). 1 printed-key error corrected openly (Q21 OLS under multicollinearity → B 'consistent and unbiased but not efficient'); 1 PICK-ONE (Q49 'underneath' vs 'under'); 1 DEFECTIVE-excluded (Q31 hypergeometric probability 0.2509 in no option). Five-option items Q5 and Q47 filed as printed. No second full reproduction found. Answers verified independently against standard references, never from the printed key alone.

Question 1 Pakistan Studies

The first census in Pakistan was held in?

- A. 1948
- B. 1951 ✓ **Correct answer**
- C. 1953
- D. 1957

A. Wrong: the first census of Pakistan was held in 1951, not 1948.

he first census of Pakistan was held in 1951.

C. Wrong: the first census of Pakistan was held in 1951, not 1953.

D. Wrong: the first census of Pakistan was held in 1951, not 1957.

Question 2 English (Vocabulary)

The Antonym of Meticulous is?

- A. Careless
- B. Sloppy
- C. Scrupulous
- D. Both A and B ✓ **Correct answer**

A. Wrong: careless is a near-antonym of meticulous, but the verified answer covers both careless and sloppy, so A alone is not the full answer.

B. Wrong: sloppy is a near-antonym of meticulous, but the verified answer covers both careless and sloppy, so B alone is not the full answer.

C. Wrong: scrupulous means careful and thorough, which is a synonym of meticulous, not its antonym.

D. Correct: both careless and sloppy are antonyms of meticulous, so both A and B together are the answer.

Question 3 Mathematics (Probability)

The probability of getting 3 tails when balanced coins are tossed once?

- A. 1/8 ✓ **Correct answer**
- B. 1/4
- C. 1/2
- D. 3/8

For three coins tossed once there are 2^3 = 8 equally likely outcomes and only one is three tails, so the probability is 1/8.

B. Wrong: 1/4 is not the value the count of outcomes gives; only one of the eight outcomes is three tails, giving 1/8.

C. Wrong: 1/2 is the probability of a tail on a single toss, not of three tails in three tosses, which is 1/8.

D. Wrong: 3/8 is not the value the count of outcomes gives; only one of the eight outcomes is three tails, giving 1/8.

Question 4 English (Idiom)

To read between the lines means?

- A. To suspect
- B. To grasp the hidden meaning ✓ **Correct answer**
- C. To concentrate
- D. To read carefully

A. Wrong: to suspect is not the meaning of the idiom; the idiom is about understanding what is not said outright.

B. Correct: to read between the lines means to grasp the hidden or implied meaning behind the words.

C. Wrong: to concentrate is not the meaning of the idiom; it is about grasping the hidden meaning.

D. Wrong: to read carefully is not the meaning of the idiom; it is about grasping the hidden meaning.

5 English (Vocabulary)

Secretly listening to a conversation of others is called _____?

- A. Eavesdropper ✓ **Correct answer**
- B. Overhearing
- C. Pigeonholing
- D. Spying
- E. None of these

A. Correct: one who secretly listens to a conversation of others is called an eavesdropper.

B. Wrong: overhearing is the act of hearing by chance, not the name for a person who secretly listens.

C. Wrong: pigeonholing means putting something into a category, not secretly listening to a conversation.

D. Wrong: spying is watching or gathering information secretly in a general sense, not the specific name for one who secretly listens to a conversation.

E. Wrong: an eavesdropper is among the options and is correct, so none of these is wrong.

Question 6 Mathematics

The standard deviation of the binomial distribution is ___?

- A. √npq ✓ **Correct answer**
- B. √np
- C. npq
- D. None of these

A. Correct: for a binomial distribution with parameters n and p (and q = 1 - p), the standard deviation is the square root of npq.

B. Wrong: the square root of np is not the binomial standard deviation; the variance is

standard deviation is the square root of npq.

C. Wrong: npq is the variance of the binomial distribution, not its standard deviation; the standard deviation is the square root of npq.

D. Wrong: the square root of npq is among the options and is correct, so none of these is wrong.

Question 7 English (Grammar)

While UK has earned record revenue this year, _____ well behind in exports.

- A. It still lag
- B. It still lags ✓ **Correct answer**
- C. It lag still
- D. It lags still

A. Wrong: it still lag is ungrammatical: the singular subject it needs the third-person singular lags.

B. Correct: it still lags is the grammatical form: the singular subject it takes lags, with still in its usual place before the verb.

C. Wrong: it lag still is ungrammatical: the singular subject it needs lags, and still belongs before the verb.

D. Wrong: it lags still is ungrammatical word order: still belongs before the main verb, as in it still lags.

Question 8 English (Analogy)

Gill: Fin ::

- A. Cockroach: Antenna
- B. Instrument: Pencil
- C. Hard Disk : Keyboard ✓ **Correct answer**

ad. Butter

A. Wrong: a cockroach and an antenna are whole and part, not two parts of the same whole as a gill and a fin are parts of a fish.

B. Wrong: an instrument and a pencil are not two parts of the same whole in the way a gill and a fin are both parts of a fish.

C. Correct: a gill and a fin are both parts of a fish, just as a hard disk and a keyboard are both parts of a computer.

D. Wrong: bread and butter are two foods served together, not two parts of a single whole as a gill and a fin are parts of a fish.

Question 9 Mathematics

Which of the following statements is true about the null hypothesis?

- A. Any wrong decision related to the null hypothesis results in two types of errors ✓ **Correct answer**
- B. Any wrong decision related to the null hypothesis results in one type of error
- C. Any wrong decision related to the null hypothesis results in four types of errors
- D. Any wrong decision related to the null hypothesis results in three types of errors

A. Correct: a wrong decision about the null hypothesis gives two types of error: rejecting a true null hypothesis (Type-I) and accepting a false null hypothesis (Type-II).

B. Wrong: a wrong decision about the null hypothesis gives two types of error, not one.

C. Wrong: a wrong decision about the null hypothesis gives two types of error, not four.

D. Wrong: a wrong decision about the null hypothesis gives two types of error, not three.

Question 10 Computer

What is the advantage of using SPSS over calculating statistics by hand?

- B. It reduces the chance of making errors in your calculations
- C. Many researchers use SPSS as it is recognized software package
- D. All of these ✓ **Correct answer**

A. Wrong: SPSS does equip the user with a useful transferable skill, but that is only one of its advantages, so A alone is not the full answer.

B. Wrong: SPSS does reduce the chance of calculation errors, but that is only one of its advantages, so B alone is not the full answer.

C. Wrong: SPSS is indeed widely used and recognised software, but that is only one of its advantages, so C alone is not the full answer.

D. Correct: all of these are advantages of SPSS over calculating statistics by hand: a transferable skill, fewer calculation errors, and a recognised package used by many researchers.

Question 11 Mathematics

The control charts and procedures of descriptive statistics which are used to enhance a procedure can be classified into which of these categories?

- A. Behavioural tools
- B. Serial tools
- C. Industry statistics
- D. Statistical tools ✓ **Correct answer**

A. Wrong: control charts and descriptive-statistics procedures are statistical tools, not behavioural tools.

B. Wrong: control charts and descriptive-statistics procedures are statistical tools, not serial tools.

C. Wrong: control charts and descriptive-statistics procedures are statistical tools, not

D. Correct: control charts and procedures of descriptive statistics used to enhance a procedure are classified as statistical tools.

Question 12 Mathematics

The product of first 'n' natural numbers is _____?

- A. 1.2.3.4,.....
- B. 1.2.3.....(n-2) (n-1) (n) ✓ **Correct answer**
- C. n. (n-1) (n-2).....3.2.1.0
- D. None

A. Wrong: 1.2.3.4, and so on without end does not give the product of the first n natural numbers; the product must stop at n.

B. Correct: the product of the first n natural numbers is 1.2.3...(n-2)(n-1)(n), which is n factorial.

C. Wrong: the product ending in 3.2.1.0 includes a factor 0, which would make the whole product zero; the product of the first n natural numbers has no factor 0.

D. Wrong: option B gives the product of the first n natural numbers, so none is wrong.

Question 13 Mathematics

Which of the following techniques is an analysis of the relationship between two variables to help provide the prediction mechanism?

- A. Standard error
- B. Correlation
- C. Regression ✓ **Correct answer**
- D. None of these

A. Wrong: standard error measures the variability of an estimate, it is not the technique

the relationship between two variables to predict one from the other.

B. Wrong: correlation measures the strength of the relationship between two variables, but the technique that provides the prediction mechanism is regression.

C. Correct: regression analyses the relationship between two variables and gives the prediction mechanism, the regression equation.

D. Wrong: regression is among the options and is correct, so none of these is wrong.

Question 14 Mathematics

Which hypothesis tell us weather test is one tail or 2 tail?

- A. Simple hypothesis
- B. Null hypothesis
- C. Alternate hypothesis ✓ **Correct answer**
- D. Both A and B

A. Wrong: a simple hypothesis specifies the parameter completely, but it is the alternative hypothesis that tells whether the test is one-tailed or two-tailed.

B. Wrong: the null hypothesis is the hypothesis tested, but whether the test is one-tailed or two-tailed is told by the alternative hypothesis.

C. Correct: the alternative hypothesis tells whether the test is one-tailed or two-tailed, because its direction (greater than, less than, or not equal to) fixes the rejection region.

D. Wrong: it is the alternative hypothesis alone, not both A and B, that tells whether the test is one-tailed or two-tailed.

Question 15 Mathematics

What would be the consequences for the OLS estimator heteroscedasticity is present in a regression model but ignored?

- B. It will be inconsistent
- C. It will be inefficient ✓ **Correct answer**
- D. All of A, B and C will be true

A. Wrong: heteroscedasticity does not make the OLS estimator simply ignored; it has a specific consequence for its efficiency.

B. Wrong: under heteroscedasticity the OLS estimator remains unbiased and consistent; it is not inconsistent.

C. Correct: when heteroscedasticity is present but ignored, the OLS estimator remains unbiased and consistent but is inefficient, because it no longer has minimum variance.

D. Wrong: not all of A, B and C are true: the OLS estimator is inefficient, but it is not inconsistent and it is not ignored.

Question 16 Mathematics

When several unbiased samples are drawn from the same population, the sampling technique is?

- A. Random Sampling ✓ **Correct answer**
- B. Nonrandom sampling
- C. Nonprobability sampling
- D. Purposive sampling

A. Correct: when several unbiased samples are drawn from the same population, the sampling technique is random sampling, in which every unit has a known chance of selection.

B. Wrong: nonrandom sampling does not give unbiased samples drawn in this way; random sampling is the technique described.

C. Wrong: nonprobability sampling does not give unbiased samples drawn in this way;

pling is the technique described.

D. Wrong: purposive sampling selects units by judgement, not by the random process that gives unbiased samples; random sampling is the technique described.

Question 17 Mathematics (Probability)

Which of the following is not a correct information about a probability?

- A. It must have value between 0 and 1
- B. It can be reported as a decimal or fraction
- C. A value near zero means that the event is not to occur
- D. It is the collection of several experiments ✓ **Correct answer**

A. Wrong: a probability must indeed have a value between 0 and 1, so this is correct information about a probability.

B. Wrong: a probability can indeed be reported as a decimal or a fraction, so this is correct information about a probability.

C. Wrong: a value near zero does indeed mean the event is unlikely to occur, so this is correct information about a probability.

D. Correct: a probability is not the collection of several experiments; it is a number between 0 and 1 measuring the chance of an event, so this is not correct information about a probability.

Question 18 Mathematics

Which of the following statements is true about the type-II error?

- A. Type-II error means to accept an incorrect hypothesis ✓ **Correct answer**
- B. Type-II error means to reject an incorrect hypothesis
- C. Type-II error means to accept a correct hypothesis
- D. Type-II error means to reject a correct hypothesis

Type-II error means accepting an incorrect hypothesis, that is, failing to reject a false null hypothesis.

B. Wrong: rejecting an incorrect hypothesis is the correct decision, not a Type-II error; a Type-II error is accepting an incorrect hypothesis.

C. Wrong: accepting a correct hypothesis is the correct decision, not a Type-II error; a Type-II error is accepting an incorrect hypothesis.

D. Wrong: rejecting a correct hypothesis is a Type-I error, not a Type-II error; a Type-II error is accepting an incorrect hypothesis.

Question 19 Mathematics

X is a uniform variate between 0 and 3. The value of $E(X^2)$ is?

- A. 3 ✓ **Correct answer**
- B. 7
- C. 27
- D. 9

A. Correct: for X uniform on 0 to 3, E(X squared) is the integral of x squared from 0 to 3 divided by 3, which is 9 divided by 3, that is 3.

B. Wrong: 7 is not the value the uniform-distribution calculation gives; E(X squared) is 3.

C. Wrong: 27 is the value of 3 cubed, not E(X squared); the calculation gives 3.

D. Wrong: 9 is not E(X squared); the uniform-distribution calculation gives 3.

Question 20 Mathematics

Which of the following is not a measure of dispersion?

- A. Range
- B. Standard deviation

efficient of variation

- D. Second Quartile ✓ **Correct answer**

A. Wrong: range is a measure of dispersion, so it is not the answer to which is not a measure of dispersion.

B. Wrong: standard deviation is a measure of dispersion, so it is not the answer to which is not a measure of dispersion.

C. Wrong: coefficient of variation is a measure of dispersion, so it is not the answer to which is not a measure of dispersion.

D. Correct: the second quartile is the median, a measure of central tendency, not a measure of dispersion.

Question 21 Mathematics

What will be properties of the OLS estimator in the presence of multicollinearity?

- A. It will be consistent unbiased and efficient
- B. It will be consistent and unbiased but not efficient ✓ **Correct answer**
- C. It will be consistent but not unbiased
- D. It will not be consistent

A. Wrong: under multicollinearity OLS remains consistent and unbiased, but it is not efficient, because its variance is inflated; the printed key A is the error corrected in the verification summary.

B. Correct: under multicollinearity the OLS estimator remains consistent and unbiased but is not efficient, because multicollinearity inflates its variance.

C. Wrong: under multicollinearity OLS remains unbiased; it is not true that it is consistent but not unbiased.

D. Wrong: under multicollinearity OLS remains consistent; it is not true that it will not be

Question 22 Mathematics

Which of the following statements is true about the correlational analysis between two sets of data?

- A. The correlational analysis between two sets of data is known as a simple correlation ✓ **Correct answer**
- B. The correlational analysis between two sets of data is known as multiple correlation
- C. The correlational analysis between two sets of data is known as partial correlation
- D. None

A. Correct: correlational analysis between two sets of data is known as simple correlation.

B. Wrong: multiple correlation involves one variable with several others, not the analysis between two sets of data, which is simple correlation.

C. Wrong: partial correlation measures the relationship between two variables with others held constant, not the analysis between two sets of data, which is simple correlation.

D. Wrong: simple correlation is among the options and is correct, so none is wrong.

Question 23 Mathematics

Which of the following is true for the coefficient of correlation?

- A. The coefficient of correlation does not depend on the change of scale
- B. The coefficient of correlation does not depend on the change of origin
- C. The coefficient of correlation does not depend on both the change of scale and change of origin ✓ **Correct answer**
- D. None of these

A. Wrong: the coefficient of correlation does not depend on the change of origin either, so

B. Wrong: the coefficient of correlation does not depend on the change of scale either, so B alone is not the full answer.

C. Correct: the coefficient of correlation does not depend on both the change of scale and the change of origin.

D. Wrong: option C states the correct property, so none of these is wrong.

Question 24 Mathematics

Which of these can be used to develop a new process?

- A. Design of experiments ✓ **Correct answer**
- B. Acceptance sampling
- C. Control charts
- D. Histogram

A. Correct: design of experiments is used to develop a new process, by systematically varying factors to find the best settings.

B. Wrong: acceptance sampling checks whether a lot meets quality standards; it is not used to develop a new process.

C. Wrong: control charts monitor an existing process for stability; they are not used to develop a new process.

D. Wrong: a histogram displays the distribution of data; it is not used to develop a new process.

Question 25 Mathematics

The dependence of a variable on two or more than two independent variable, the relation is said to be _____?

tiple regression ✓ **Correct answer**

- B. Regression Analysis
- C. Multicollinearity
- D. Analysis of Coveriance

A. Correct: when a variable depends on two or more independent variables, the relation is multiple regression.

B. Wrong: regression analysis is the general term, but the relation with two or more independent variables is specifically multiple regression.

C. Wrong: multicollinearity is correlation among the independent variables themselves, not the name for a variable depending on two or more independent variables.

D. Wrong: analysis of covariance is a different technique combining regression with analysis of variance, not the name for a variable depending on two or more independent variables.

Question 26 English (Grammar)

She is going to quit her job _____ they give her a pay rise.

- A. Or
- B. Until
- C. Unless ✓ **Correct answer**
- D. Providing

A. Wrong: or does not give the intended meaning: she will quit unless a pay rise is given, not as an alternative.

B. Wrong: until means up to the time when, which does not give the intended conditional meaning; unless is the word needed.

C. Correct: unless gives the intended meaning: she is going to quit her job unless, that is if not, they give her a pay rise.

providing means on condition that, which does not give the intended negative condition; unless is the word needed.

Question 27 Mathematics (Probability)

What is the probability that a randomly selected family from the 400 families owns the house if 300 of them own houses?

- A. 0.75 ✓ **Correct answer**
- B. 0.50
- C. 0.25
- D. 0.60

A. Correct: 300 of 400 families own houses, so the probability is 300/400 = 0.75.

B. Wrong: 0.50 is not the value the count gives; 300 out of 400 is 0.75.

C. Wrong: 0.25 is the share of families that do not own houses, not the share that do; the probability of owning is 0.75.

D. Wrong: 0.60 is not the value the count gives; 300 out of 400 is 0.75.

Question 28 Mathematics (Probability)

Two mutually exclusive events are ____?

- A. Dependent ✓ **Correct answer**
- B. Independent
- C. Overlapped
- D. None

A. Correct: two mutually exclusive events are dependent, because the occurrence of one rules out the other, so the probability of one given the other is zero.

B. Wrong: mutually exclusive events are not independent: if one occurs the other cannot, so they are dependent.

utually exclusive events do not overlap, by definition; they are dependent, not overlapped.

D. Wrong: mutually exclusive events are dependent, which is among the options, so none is wrong.

Question 29 Mathematics

The standard deviation of a sample of 100 observations equals 64. The variance of the sample equals?

- A. 8
- B. 10
- C. 6400
- D. 4096 ✓ **Correct answer**

A. Wrong: 8 is the square root of 64, the standard deviation itself, not the variance; the variance is the square of the standard deviation.

B. Wrong: 10 is not the value the calculation gives; the variance is the square of 64.

C. Wrong: 6400 is 64 times 100, not the variance; the variance is the square of the standard deviation, 64 squared.

D. Correct: the variance is the square of the standard deviation: 64 squared is 4096.

Question 30 Economics

When the production of a thing is maximum, this state is called?

- A. Boom ✓ **Correct answer**
- B. Recovery
- C. Recession
- D. Depression

A. Correct: when the production of a thing is at its maximum, that state of the trade cycle

B. Wrong: recovery is the phase when production rises again after a depression, not the state when production is at its maximum.

C. Wrong: recession is a phase of falling production, not the state when production is at its maximum.

D. Wrong: depression is the phase when production is at its lowest, not the state when production is at its maximum.

Question 31 Mathematics — DEFECTIVE-EXCLUDED (no answer asserted; not in the JSON)

Emma likes to play cards. She draws 5 cards from a pack of 52 cards. What is the probability that from the 5 cards drawn Emma draws only 2 face cards?

- A. 0.0533
- B. 0.0753
- C. 0.0633
- D. 0.6573

No answer is given for this question, and none is taught. DEFECTIVE — EXCLUDED (no answer asserted)

Question 32 Mathematics

Which of the following value is used as a summary measure for a sample?

- A. Population parameter
- B. Sample parameter
- C. Sample statistic ✓ **Correct answer**
- D. Population mean

A. Wrong: a population parameter summarises a population, not a sample; the summary

a sample is the sample statistic.

B. Wrong: sample parameter is not the standard term; the summary measure for a sample is the sample statistic.

C. Correct: a sample statistic is the summary measure computed from a sample.

D. Wrong: the population mean summarises a population, not a sample; the summary measure for a sample is the sample statistic.

Question 33 Mathematics

In Cramer-Rao Inequality var (T) is called?

- A. Complete
- B. Minimum variance bond ✓ **Correct answer**
- C. Efficient
- D. None of these

A. Wrong: in the Cramer-Rao inequality var(T) is not called complete; it is the variance whose lower bound the inequality gives.

B. Correct: in the Cramer-Rao inequality var(T) is called the minimum variance bound, the lower bound on the variance of an unbiased estimator.

C. Wrong: efficient describes an estimator that attains the bound, not the name of var(T) in the inequality; var(T) is the minimum variance bound.

D. Wrong: the minimum variance bound is among the options and is correct, so none of these is wrong.

Question 34 Mathematics (Probability)

If the mean (m) of a Poisson distribution is 1, then the probability of P(1) is?

- A. 1/e ✓ **Correct answer**

- C. 1/2
- D. None

A. Correct: for a Poisson distribution with mean 1, P(1) is e to the power minus 1 times 1 to the power 1 over 1 factorial, which is 1/e.

B. Wrong: e is not the value the Poisson calculation gives; P(1) with mean 1 is 1/e.

C. Wrong: 1/2 is not the value the Poisson calculation gives; P(1) with mean 1 is 1/e.

D. Wrong: 1/e is among the options and is correct, so none is wrong.

Question 35 Mathematics

If the member of unknowns are greater than number of equations, we use as the method for estimation?

- A. MLE
- B. Bay's method
- C. Least square method for estimation ✓ **Correct answer**
- D. None of these

A. Wrong: maximum likelihood estimation is not the method named for estimation when the number of unknowns exceeds the number of equations; the least-squares method is.

B. Wrong: Bayes method is not the method named for estimation when the number of unknowns exceeds the number of equations; the least-squares method is.

C. Correct: when the number of unknowns is greater than the number of equations, the least-squares method for estimation is used.

D. Wrong: the least-squares method for estimation is among the options and is correct, so none of these is wrong.

36 Mathematics (Probability)

If 'm' is the mean of a Poisson Distribution, then variance is given by?

- A. m^2
- B. √m
- C. m ✓ **Correct answer**
- D. None

A. Wrong: for a Poisson distribution the variance is m, not m squared.

B. Wrong: for a Poisson distribution the variance is m, not the square root of m.

C. Correct: for a Poisson distribution with mean m, the variance is also m; mean and variance are equal.

D. Wrong: m is among the options and is correct, so none is wrong.

Question 37 Mathematics

Which of the following is NOT a basic principle of experimental design?

- A. Randomization
- B. Confounding ✓ **Correct answer**
- C. Replication
- D. None

A. Wrong: randomization is a basic principle of experimental design, so it is not the answer to which is not a basic principle.

B. Correct: confounding is not a basic principle of experimental design; the basic principles are randomization, replication and local control, and confounding is a fault to be avoided.

C. Wrong: replication is a basic principle of experimental design, so it is not the answer to which is not a basic principle.

onfounding is among the options and is the answer, so none is wrong.

Question 38 Mathematics

Rao-Black well theorem enables us to obtain minimum variance unbiased estimate through _____?

- A. Un-biased estimators
- B. Complete statistics
- C. Efficient statistics
- D. Sufficient statistics ✓ **Correct answer**

A. Wrong: unbiased estimators alone are not what the Rao-Blackwell theorem uses; it works through sufficient statistics.

B. Wrong: complete statistics are used in related results, but the Rao-Blackwell theorem obtains the minimum variance unbiased estimate through sufficient statistics.

C. Wrong: efficient statistics is not what the Rao-Blackwell theorem uses; it works through sufficient statistics.

D. Correct: the Rao-Blackwell theorem enables us to obtain a minimum variance unbiased estimate through sufficient statistics, by conditioning an unbiased estimator on a sufficient statistic.

Question 39 Mathematics (Probability)

Geometric random variable P(X = n) =(1-p)^(n-1) p, holds?

- A. Independent trails and n = 0, 1, 2, 3,.....
- B. Independent trails and n = 1, 2, 3,..... ✓ **Correct answer**
- C. Dependent trails and n = 0, 1, 2, 3.....
- D. Dependent trails and n = 1, 2, 3,.....

A. Wrong: the geometric distribution P(X = n) = (1-p) to the power n-1 times p holds for

: trials with n starting at 1, not n = 0, 1, 2, 3 and so on.

B. Correct: the geometric random variable P(X = n) = (1-p) to the power n-1 times p holds for independent trials with n = 1, 2, 3 and so on, counting the trial of the first success.

C. Wrong: the geometric distribution requires independent trials, not dependent trials, and n starts at 1.

D. Wrong: the geometric distribution requires independent trials, not dependent trials, and n starts at 1.

Question 40 Mathematics

What is the sum of deviations from the regression line?

- A. Positive
- B. Negative
- C. Zero ✓ **Correct answer**
- D. Varies

A. Wrong: the sum of deviations from the regression line is not positive; the regression line is fitted so that the residuals sum to zero.

B. Wrong: the sum of deviations from the regression line is not negative; the regression line is fitted so that the residuals sum to zero.

C. Correct: the sum of deviations from the regression line is zero, because the least-squares line passes through the mean point and the residuals cancel out.

D. Wrong: the sum of deviations from the regression line does not vary; it is zero.

Question 41 Mathematics

The error of rejecting the null hypothesis when it is true is known as?

- A. Type-1 error ✓ **Correct answer**

- C. Type-III error
- D. Type-IV error

A. Correct: the error of rejecting the null hypothesis when it is true is known as a Type-I error.

B. Wrong: a Type-II error is accepting a false null hypothesis, not rejecting a true one; rejecting a true null hypothesis is a Type-I error.

C. Wrong: there is no standard Type-III error for rejecting a true null hypothesis; that error is a Type-I error.

D. Wrong: there is no standard Type-IV error for rejecting a true null hypothesis; that error is a Type-I error.

Question 42 Mathematics

To find the average speed of a journey, which is the appropriate measure of central tendency?

- A. Mean
- B. Geometric mean
- C. Harmonic Mean ✓ **Correct answer**
- D. Weighted Mean

A. Wrong: the ordinary arithmetic mean is not the appropriate average for speeds over equal distances; the harmonic mean is.

B. Wrong: the geometric mean is used for rates of growth, not for the average speed of a journey; the harmonic mean is.

C. Correct: the harmonic mean is the appropriate measure of central tendency for finding the average speed of a journey over equal distances.

e weighted mean is not the standard measure for average speed over equal distances; the harmonic mean is.

Question 43 Mathematics (Probability)

If K denotes the degree of freedom, then the variance of Chi-square distribution is?

- A. k/2
- B. k-1
- C. k-2
- D. 2k ✓ **Correct answer**

A. Wrong: the variance of a chi-square distribution with k degrees of freedom is 2k, not k/2.

B. Wrong: the variance of a chi-square distribution with k degrees of freedom is 2k, not k-1.

C. Wrong: the variance of a chi-square distribution with k degrees of freedom is 2k, not k-2.

D. Correct: the variance of a chi-square distribution with k degrees of freedom is 2k.

Question 44 Mathematics

What is the difference between a sample statistic and the population parameter?

- A. Measurement error
- B. Sampling error ✓ **Correct answer**
- C. Standard error
- D. Systematic error

A. Wrong: measurement error is error in measuring, not the difference between a sample statistic and the population parameter; that difference is sampling error.

B. Correct: the difference between a sample statistic and the population parameter is

or, the error arising from using a sample instead of the whole population.

C. Wrong: standard error is the standard deviation of a sampling distribution, not the name for the difference between a sample statistic and the population parameter; that difference is sampling error.

D. Wrong: systematic error is a consistent bias, not the difference between a sample statistic and the population parameter; that difference is sampling error.

Question 45 Mathematics

Which of the following statements about the Central Limit Theorem (CLT) is correct?

- A. The CLT states that the sample mean x is always equal to the population mean, μ
- B. The CLT states that the sampling distribution of the sample mean x is approximately normal, for large sample sizes (n>30) ✓ **Correct answer**
- C. The CLT states that the sample mean x is equal to the population mean m, provided that n>30
- D. The CLT states that the sampling distribution of the population mean m is approximately normal, provided that n>30

A. Wrong: the CLT does not say the sample mean is always equal to the population mean; it says the sampling distribution of the sample mean is approximately normal for large samples.

B. Correct: the CLT states that the sampling distribution of the sample mean is approximately normal for large sample sizes (n greater than 30).

C. Wrong: the CLT does not say the sample mean equals the population mean when n is greater than 30; it says the sampling distribution of the sample mean is approximately normal.

D. Wrong: the CLT concerns the sampling distribution of the sample mean, not of the population mean; and it is the sample mean whose distribution is approximately normal for large n.

46 Mathematics

Which of the following is the correct statement regarding the coefficient of correlation?

- A. It depends on the scale of measurement
- B. It depends on the origin of the measurement
- C. It is independent of both the scale and origin ✓ **Correct answer**
- D. It depends on either the scale or origin

A. Wrong: the coefficient of correlation does not depend on the scale of measurement; it is independent of both scale and origin.

B. Wrong: the coefficient of correlation does not depend on the origin of measurement; it is independent of both scale and origin.

C. Correct: the coefficient of correlation is independent of both the scale and the origin of measurement.

D. Wrong: the coefficient of correlation does not depend on either the scale or the origin; it is independent of both.

Question 47 English (Vocabulary)

The synonym of RHETORIC is?

- A. Oratory ✓ **Correct answer**
- B. Rhythm
- C. Renunciation
- D. Abundance
- E. All of these

A. Correct: rhetoric is the art of effective speaking, so its synonym is oratory.

B. Wrong: rhythm is the pattern of sounds, not a synonym of rhetoric.

C. Wrong: renunciation means giving something up, not a synonym of rhetoric.

bundance means a large quantity, not a synonym of rhetoric.

E. Wrong: not all of these are synonyms of rhetoric; only oratory is, so all of these is wrong.

Question 48 English (Grammar)

What are they doing does not seem _____ working?

- A. Being
- B. Be
- C. To be ✓ **Correct answer**
- D. To being

A. Wrong: being does not fit after seem in this construction; the verb needed is to be.

B. Wrong: be does not fit after seem in this construction; the verb needed is to be.

C. Correct: to be is the form needed after seem: what are they doing does not seem to be working.

D. Wrong: to being is ungrammatical after seem; the verb needed is to be.

Question 49 English (Grammar)

I took the gun and hid it ____ the sofa.

- A. Under
- B. Below
- C. Beneath
- D. Underneath ✓ **Correct answer**

A. Also grammatical: 'under' fits the sentence too, which is why this item is a pick-one rather than a clean verified item; underneath is the more precise choice for hiding something, so D is picked.

elow suggests a lower position or level, not the hiding place under the sofa; underneath is the picked answer.

C. Wrong: beneath is a formal word for under, but it is not the printed key or the picked answer for hiding something under the sofa; underneath is picked.

D. Picked: underneath is the printed key and is kept as the intended answer: it is the more precise choice for hiding something under the sofa.

Question 50 English (Grammar)

He was driving a car, when accident occurred.

- A. A car was driven by him, when the accident occur.
- B. A car was being driven by him, when accident occurred. ✓ **Correct answer**
- C. A car driven by him, when the accident occur.
- D. A car was been driven by him, when the accident occurred.

A. Wrong: a car was driven by him, when the accident occur is ungrammatical: occur should be occurred, and the continuous past is needed for the action in progress.

B. Correct: the past continuous passive is correct: a car was being driven by him, when the accident occurred.

C. Wrong: a car driven by him, when the accident occur is ungrammatical: it lacks the auxiliary was being and occur should be occurred.

D. Wrong: a car was been driven by him is ungrammatical: been cannot follow was in this construction; the correct form is was being driven.

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