

Question Bank

1. Normal Distribution is applied for
- a) Continuous Random Distribution
 - b) Discrete Random Variable
 - c) Irregular Random Variable
 - d) Uncertain Random Variable

Answer: a

Explanation: This is the rule on which Normal distribution is defined, no details on this as of why. For more knowledge on this aspect, you can refer to any book or website which speaks on the same.

2. The shape of the Normal Curve is
- a) Bell Shaped
 - b) Flat
 - c) Circular
 - d) Spiked

Answer: a

Explanation: Due to the nature of the Probability Mass function, a bell shaped curve is obtained.

3. Normal Distribution is symmetric about
- a) Variance
 - b) Mean
 - c) Standard deviation
 - d) Covariance

Answer: b

Explanation: Due to the very nature of p.m.f of Normal Distribution, the graph appears such that it is symmetric about its mean.

4. For a standard normal variate, the value of mean is
- a) ∞
 - b) 1
 - c) 0
 - d) not defined

Answer: c

Explanation: For a normal variate, if its mean = 0 and standard deviation = 1, then it is called as Standard Normal Variate. Here, the converse is asked.

5. The area under a standard normal curve is
- a) 0
 - b) 1
 - c) ∞
 - d) not defined

Answer: b

Explanation: For any probability distribution, the sum of all probabilities is 1. Area under normal curve refers to sum of all probabilities.

6. The standard normal curve is symmetric about the value
- a) 0.5
 - b) 1

- c) ∞
- d) 0

Answer: d

Explanation: Normal curve is always symmetric about mean, for standard normal curve or variate mean = 0.

7. For a standard normal variate, the value of Standard Deviation is

- a) 0
- b) 1
- c) ∞
- d) not defined

Answer: b

Explanation: If the mean and standard deviation of a normal variate are 0 and 1 respectively, it is called as standard normal variate. Here the converse is asked.

8. Normal Distribution is also known as

- a) Cauchy's Distribution
- b) Laplacian Distribution
- c) Gaussian Distribution
- d) Lagrangian Distribution

Answer: c

Explanation: Named after the one who proposed it. For further details, refer to books or internet.

9. Skewness of Normal distribution is

- a) Negative
- b) Positive
- c) 0
- d) Undefined

Answer: c

Explanation: Since the normal curve is symmetric about its mean, its skewness is zero. This is a theoretical explanation for mathematical proofs, you can refer to books or websites that speak on the same in detail.

10. For a normal distribution its mean, median, mode are equal

- a) True
- b) False

Answer: a

Explanation: It has a theoretical evidence that requires some serious background on several topics For more details you can refer to any book or website that speaks on the same.

11. In Normal distribution, the highest value of ordinate occurs at

- a) Mean
- b) Variance
- c) Extremes
- d) Same value occurs at all points

Answer: a

Explanation: This is due the behaviour of the pdf of Normal distribution.

12. The shape of the normal curve depends on its

- a) Mean deviation
- b) Standard deviation

- c) Quartile deviation
- d) Correlation

Answer: b

Explanation: This can be seen in the pdf of normal distribution where standard deviation is a variable.

13. The value of constant 'e' appearing in normal distribution is

- a) 2.5185
- b) 2.7836
- c) 2.1783
- d) 2.7183

Answer: d

Explanation: This is a standard constant.

14. In Standard normal distribution, the value of mode is

- a) 2
- b) 1
- c) 0
- d) Not fixed

Answer: c

Explanation: In a standard normal distribution, the value of mean is 0 and in normal distribution mean and mode coincides

15. In Standard normal distribution, the value of median is

- a) 1
- b) 0
- c) 2
- d) not fixed

Answer: b

Explanation: In a standard normal distribution the value of mean is 0 and in normal distribution mean, median and mode coincide.

16. The main difference between the z and t-tests is that

- A. for a t-test, the population mean and standard deviation are needed.
- B. for a t-test only the sample mean is needed.
- C. for a z-test the population mean and standard deviation are needed.
- D. The z and t-tests are identical except for the size of the sample used.

Answer: c

Explanation: The main difference between the z and t-tests is that with the t-test you only need to know the mean of the population and not the population standard deviation. For the t-test you can estimate the population standard deviation with the sample standard deviation.

17. How does the shape of the t-distribution change as the sample size increases?

- A. It becomes broader.
- B. It becomes skewed.
- C. It becomes flatter.
- D. It becomes more normal looking.

Answer: d

Explanation: As the number of observations increases the t-distribution gets to look more like the standard normal distribution.

18. Which of the following would most likely cause the confidence interval to become smaller?

- A. decreasing N
- B. increasing the mean
- C. increasing alpha
- D. decreasing the standard error

Answer: d

Explanation: Since a term including the standard error is added to and subtracted from the mean, if the standard error is smaller a smaller product will be added to and subtracted from the mean.

19. One of the reasons that a correlated-groups design is more powerful than an independent-samples design is that in the correlated-groups design

- A. the error term is based on all the raw scores.
- B. the df is greater.
- C. the error term is based on the difference scores.
- D. the dependent measure is correlated with the subject variables.

Answer: c

Explanation: The error term depends on the variance in the difference scores, thus eliminating much of the variability due to individual differences.

20. My friend, Bob, believes that his supermarket's prices are lower than mine. We construct a list of identical items and purchase them at our respective stores every week for two months. Then Bob wants to know if his hypothesis is supported.

- A. Bob has a directional hypothesis and should do a matched t-test.
- B. Bob has a non-directional hypothesis and should do an independent t-test.
- C. Bob has a directional hypothesis and should do an independent t-test.
- D. Bob has a non-directional hypothesis and should do a one sample t-test.

Answer: a

Explanation: He has a specific prediction that his supermarket is cheaper and since we are comparing prices on the same items we can pair our scores (prices).

21. If I want to compare the performance of a particular group to an established, accepted average but information about the population standard deviation is not available. I should

- A. conclude that this cannot be done.
- B. conduct a one-sample t-test.
- C. conduct a one-sample z-test.
- D. conduct a correlated t -test.

Answer: b

22. If we hold all other factors constant, then as the error term of a t-statistic becomes greater,

- A. the between-groups variance becomes greater.
- B. the probability of making a Type I error increases.
- C. the probability of making a Type II error increases
- D. there is a greater likelihood of rejecting the null hypothesis.

Answer: c

Explanation As the error term gets bigger, the difference between the groups looks smaller and thus reduces the t value and our probability of rejecting a false null hypothesis.

23. Which of the following is a measure of degree of association?

- A. the probability value
- B. the t-value

- C. the degrees of freedom
- D. the omega squared

Answer: d

24. Why, in some cases, is a measure of association needed in addition to a p-value for a statistical test?

- A. The p-value only specifies the reliability of the effect.
- B. The p-value only specifies the size of the effect.
- C. A measure of association reduces the probability of a Type II error.
- D. There is no good reason to want a measure of association once you have a significant result.

Answer: a

Explanation: The p value tells us if we would get the same result again but doesn't give us any information about how theoretically important the difference is.

25. A researcher in the field of educational psychology is interested in the effects an open classroom has on intellectual development. In the open classroom things are much less structured than in a traditional classroom and she believes that this might affect problem-solving skills. An elementary school in her district switched to an open classroom format last year, and she is interested to see how this has impacted on the kids problem-solving skills. She obtains a random sample of 49 fourth grade children and administers a conceptual problem-solving test to them. It is known that fourth graders in traditional classes have an average score of 82 on the test. The children in this study score an average of 86 with a standard deviation of 5.

Which of the following is an appropriate null hypothesis for this study?

- A. Open classrooms improve problem-solving skills.
- B. Open classrooms affect problem-solving skills.
- C. Problem-solving skills in open classrooms are equal to problem-solving skills in traditional classrooms.
- D. Problem-solving skills in open classrooms are better than problem-solving skills in traditional classrooms.

Answer: c

Explanation: Since the researcher has a non-directional hypothesis a non-directional null is appropriate.

26. A researcher in the field of educational psychology is interested in the effects an open classroom has on intellectual development. In the open classroom things are much less structured than in a traditional classroom and she believes that this might affect problem-solving skills. An elementary school in her district switched to an open classroom format last year, and she is interested to see how this has impacted on the kids problem-solving skills. She obtains a random sample of 49 fourth grade children and administers a conceptual problem-solving test to them. It is known that fourth graders in traditional classes have an average score of 82 on the test. The children in this study score an average of 86 with a standard deviation of 5. Use this information to answer the following five questions.

Which type of statistical test should the researcher do?

- A. one sample t-test
- B. one sample z-test
- C. independent samples t-test
- D. matched samples t-test

Answer: b

Explanation: There is one group being compared to a known parameter.

27. A researcher in the field of educational psychology is interested in the effects an open classroom has on intellectual development. In the open classroom things are much less structured than in a traditional classroom and she believes that this might affect problem-solving skills. An elementary school in her district switched to an open classroom format last year, and she is interested to see how this has impacted on the kids problem-solving skills. She obtains a random sample of 49 fourth grade children and administers a conceptual problem-solving test to them. It is known that fourth graders in traditional classes have an average score of 82 on the test. The children in this study score an average of 86 with a standard deviation of 5. Use this information to answer the following five questions.

What is the value of the standard error of the mean?

- A. 4
- B. 5
- C. 0.102
- D. 0.714

Answer: d

Explanation: That is 5 divided by the square root of 49 or 7.

28. A researcher in the field of educational psychology is interested in the effects an open classroom has on intellectual development. In the open classroom things are much less structured than in a traditional classroom and she believes that this might affect problem-solving skills. An elementary school in her district switched to an open classroom format last year, and she is interested to see how this has impacted on the kids problem-solving skills. She obtains a random sample of 49 fourth grade children and administers a conceptual problem-solving test to them. It is known that fourth graders in traditional classes have an average score of 82 on the test. The children in this study score an average of 86 with a standard deviation of 5. Use this information to answer the following five questions.

What is the value of the correct-test statistic?

- A. 5.60
- B. 82
- C. 39.22
- D. 0.05

Answer: a

Explanation: That is the group mean minus the population mean divided by the standard error.
 $(86 - 82) / .714 = 5.60$.

29. If the critical value for this example were 2.423, what would you conclude about the study?

- A. Retain the null hypothesis and claim that open classrooms affect problem-solving skills.
- B. Reject the null hypothesis and claim that open classrooms affect problem-solving skills.
- C. Accept the research hypothesis and claim type of classroom does not affect problem-solving skills
- D. There wasn't enough statistical power for you to find an effect.

Answer: b

30. One way to determine if a variable is distributed as normal is to do

- A. normal histogram plot
- B. normal probability plot
- C. normal randomness calculation.

Answer: b

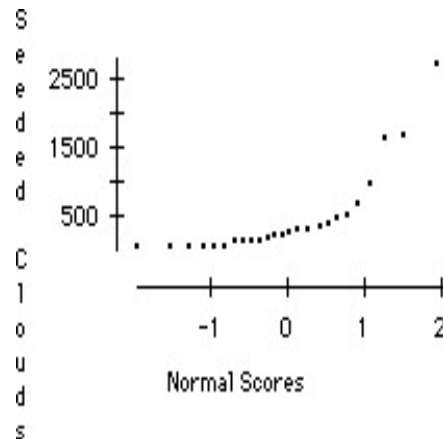
31. Standard normal distribution enables, among other things, a comparison between the two similar distributions that might be expressed in different units

- A. True
- B. False

Answer: a

Standard deviation, assuming the distributions are of the same type, allows direct comparison

33. The following graph is a normal probability plot for the amount of rainfall in acre-feet obtained from 26 randomly selected clouds that were seeded with silver oxide:



- (a) The data appear to show exponential growth; that is, the amount of rainfall increases exponentially as the amount of silver oxide increases.
- (b) The pattern suggests that the measurement is not normally distributed.
- (c) A least squares regression line should be fitted to the rainfall variable.
- (d) It can be expected that the histogram of rainfall amount will look like the normal curve.
- (e) The shape of the curve suggests that rainfall is caused by seeding the clouds with silver oxide.

A very common answer is “A” but actual Answer: “B”.

Correction: The question specifies that this is a graph of a normal probability plot. These plots are made to determine the distribution of data. If the data is normally distributed, the plot should have no visible pattern. Since this plot has a very distinct pattern, it would suggest that the data is not normally distributed, therefore “B” is the correct answer.

“A” would be correct if this was just a scatterplot of the data, not a normal probability plot. “C” is false, because LSRL’s are not appropriate on non-normal data. “D” is incorrect because a normal probability plot cannot be used to predict shape like a regular scatterplot can. “E” just doesn’t make sense in the context, correlation does not predict causation.

34. Theorem which states that as sample size increases sampling distribution must approach normal distribution is classified as

- A. limited approximation theorem
- B. secondary limit theorem
- C. primary limit theorem
- D. central limit theorem

Answer: D

35. Conditions such as large sample size to represent population and samples must be drawn randomly are included in

- A. principle of statistical regularity
- B. principle of statistical irregularity
- C. principle of sampling error
- D. principle of inertia

Answer: A

36. Measures in sampling that are results of sample analyses are called

- A. absolute statistics parameter
- B. coverage estimators
- C. population statistics
- D. sample statistic

Answer: D

37. All values in sample distribution that can freely varies in selected random sample from population are indicated as

- A. degree of freedom
- B. degree of error
- C. degree of statistic
- D. degree of possibility

Answer: A

38. IF population standard deviation is not known then formula used to calculate standard error is as

- A. $n - 1/\text{sample size square root}$
- B. $s/\text{sample size square root}$
- C. $n + 1/\text{square root of } s$
- D. $n * 2/\text{sample size square root}$

Answer: B

39. Standard deviation of a sampling distribution is also classified as

- A. standard error
- B. statistic error
- C. sampling error
- D. probability error

Answer: A

40. Uncertainty of elements can be reduced with estimation of

- A. under coverage error
- B. coverage error
- C. sampling error
- D. random sample error

Answer: C

41. In sample distribution, degree of freedom is calculated as

- A. $df = n - 2$
- B. $df = n - 1$
- C. $df = n - 3$
- D. $df = n - 5$

Answer: B

42. If p is equal to 0.65, value of N is 25000 whereas sample size is 50 then value of standard deviation of sample proportion is

- A. 0.0056
- B. 0.0045
- C. 0.0065
- D. 0.045

Answer: B

43. In sampling distribution, standard deviation must be equal to

- A. $\sigma + \text{square root of sample size}$
- B. $\sigma * \text{square root of sample size}$
- C. $\sigma - \text{square root of sample size}$
- D. $\sigma / \text{square root of sample size}$

Answer: D

44. In point estimation

- A. data from the population is used to estimate the population parameter
- B. data from the sample is used to estimate the population parameter
- C. data from the sample is used to estimate the sample statistic
- D. the mean of the population equals the mean of the sample

Answer: B

45. The _____ of a collection of data is the joint density evaluated as a function of the parameters with the data fixed.

- a) probability
- b) likelihood
- c) poisson distribution
- d) all of the Mentioned

Answer: b

Explanation: Likelihood analysis of data uses the likelihood to perform inference regarding the unknown parameter.

46. CLT is mostly useful as an approximation.

- a) True
- b) False

Answer: a

Explanation: The CLT applies in an endless variety of settings.

47. Usually replacing the standard error by its estimated value does change the CLT.

- a) True
- b) False

Answer: b

Explanation: Usually replacing the standard error by its estimated value doesn't change the CLT

48. The "Invariance" property of MLE's implies that:

- A. Their variance approaches zero as the sample size increases without limit
- B. Their variance achieves the Cramer-Rao lower bound
- C. Any monotonic function of an MLE is the MLE for that function of the parameter(s)
- D. Any continuous function of an MLE is the MLE for that function of the parameter(s)

Answer: D

49. If our random data are statistically independent, then:

- A. The likelihood function is just the sum of the marginal data densities, viewed as a function of the parameter(s)
- B. The log-likelihood function is just the product of the logarithms of the marginal data densities, viewed as a function of the parameter(s)
- C. The log-likelihood function is just the sum of the logarithms of the marginal data densities, viewed as a function of the parameter(s)
- D. The likelihood function will have a unique turning point, and this will be a maximum (not a minimum) if the sample size is large enough

Answer: C

50. The "Likelihood Equations" are:

- A. The same as the "normal equations" associated with least squares estimation of the multiple linear regression model
- B. Guaranteed to have a unique solution if the sample data are independent
- C. Obtained by getting the second derivatives of the log-likelihood function with respect to each of the parameters, and setting these equal to zero
- D. The first-order conditions that we have to solve in order to maximize the likelihood function

Answer: D

51. When we "concentrate" the likelihood function, the objective is to:

- A. Focus attention on just the important parameters by conditioning on the 'nuisance parameters' in the problem
- B. Reduce the dimension of that part of the optimization problem that has to be solved numerically
- C. Take a monotonic transformation of the likelihood function so that it is easier to find the global maximum
- D. Convert what would be a non-linear optimization problem into one that is approximately linear

Answer: B

52. Suppose that Y follows a Binomial distribution with parameter ' p ' equal to the probability of a 'success', and ' n ' repetitions. Then the MLE of the standard deviation of Y is:

- A. The square root of $np(1-p)$
- B. The square root of $y(n-y)/n$, where y is the observed number of 'successes' in the sample
- C. The square root of $n(y-n)/y$, where y is the observed number of 'successes' in the sample
- D. The square root of ny , where y is the observed number of 'successes' in the sample

Answer: B

53. The connection between a sufficient statistic and an MLE is:

- A. A sufficient statistic is always an MLE
- B. There is no connection in general
- C. All MLE's are linear combinations of sufficient statistics
- D. If an MLE is unique, then it must be a function of a sufficient statistic

Answer: B