

QUIZ - 2

1. Skewness of Normal distribution is

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

Answer: C

2. 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

3. The shape of the normal curve depends on its

- a) Mean deviation
- b) Standard deviation
- c) Quartile deviation
- d) Correlation

Answer: B

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

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

Answer: C

5. 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

6. 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

7. 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

8. 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

9. 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

10. Given standard deviation of sampling distribution of the mean as 5, and sample size 25. Find the standard error of the mean

- A. 5
- B. 1
- C. 0.2
- D. None of the above

Answer: A

11. A sample of size n is taken from a population which has an unknown distribution with mean

μ and standard deviation σ , and $\bar{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$ is used for the sample mean distribution. For

which of the following sample sizes is this valid?

- A. $n = 5$
- B. $n = 15$
- C. $n = 50$
- D. Any of the above

Answer: C

12. The Central Limit Theorem says that the sampling distribution of the sample mean is approximately normal if

- A. all possible samples are selected.
- B. the sample size is large.
- C. the standard error of the sampling distribution is small.

Answer: B

13. Samples of size 25 are selected from a population with mean 40 and standard deviation 7.5. The mean of the sampling distribution of sample means and standard error of the sampling distribution of sample means is

2 Marks

- A. 7.5, 7.5
- B. 40, 0.3,
- C. 40, 1.5

D. 7.5, 0.3

Answer: C

14. If the standard error of the sample mean is 30, with a sample size of 100, then in order to reduce the standard error of the mean to 15, you would need to _____.

A. Decrease the sample size by 50

B. increase the sample size by 200

C. increase the sample size by 400

D. increase the confidence interval

Answer: C

15. At a computer manufacturing company, the actual size of computer chips is normally distributed with a mean of 1 centimeter and a standard deviation of 0.1 centimeter. A random sample of 12 computer chips is taken. Above what value do 2.5% of the sample means fall?

A. 1.0163

B. 1.1960

C. 1.960

D. 1.0566

Answer: D

16. Fill in the blank to return the area between a and b in a normal distribution with given mean(mu) and std dev(sigma) **2 Marks**

```
from scipy.stats import norm
def fun(z1, z2):
    return _____

a = 65
b = 32
mu=25
sigma=5
z1 = (a-mu)/sigma
z2 = (b-mu)/sigma
area = fun(z1, z2)
print("required area is :",area)
```

A. $1 - \text{norm.cdf}(z2) + \text{norm.cdf}(z1)$

B. $\text{norm.cdf}(z2) - \text{norm.cdf}(z1)$

C. $\text{norm.cdf}(z2) + \text{norm.cdf}(z1)$

D. $\text{norm.cdf}(z2 - z1)$

Answer: A

17. Mean and std dev of a binomial distribution are 50 and 5 and total number of trials conducted are 100. Find the probability of getting number of successes between 45 and 55 (both included)

A. 0.6803

B. 0.7287

C. 0.5

D. 0.6319

Answer: B

18. Which of the following two functions result in same output? (NOTE: cdf, pmf, pdf, sf imported from scipy.stats.norm)

- A. cdf(), sf()
- B. pmf(), 1-cdf()
- C. sf(), 1-pdf()
- D. sf(), 1-cdf()

Answer: D