

## Quantitative Methods

1. The logarithm of a number is equal to the exponent to which a given base must be raised in order to get the number.
2. The feasible region is the set off all points which satisfy all the constraints in the LPP.
3. In case of a negatively skewed distribution Arithmetic Mean < Median < Mode.
4. Std Dev when mean and mean square are given.
  - a. 
$$\text{Std Dev} = \frac{(\sum x^2 - n\bar{X}^2)}{(N-1)}$$
5. According to the Bienayme-Chebyshev rule, at least  $(1 - 1/k^2)$  percent of the observations in a sample are contained within k standard deviations around the mean, regardless of the shape of the distribution.
6. A continuous uniform probability distribution is described by the upper and lower limits of the interval.
7. The F distribution is a distribution of the ratio of two random variables each of which follows a chi-square distribution.
8. In decision making under uncertainty the regret criterion is based on opportunity costs of decisions.
9. Other things remaining the same, if the sample size increases then the width of the confidence interval for the population mean will decrease.
10. The point estimate of population mean = sample mean
11. Advantages of chain base method of constructing index numbers
  - a. The link relatives calculated by using the chain base method, enable comparisons over successive years
  - b. It is a flexible method
  - c. Whenever found necessary, weights can be adjusted in chain base method
  - d. Seasonal variations have minimal impact on chain index numbers.
12. In ANOVA, if we have large enough sample sizes, we can discard the assumption that the samples are drawn from a normal population.
13. The following statements are true regarding simulation.
  - a. If the mathematical model set up could always be optimized by the analytical approach, then, there would be no need for simulation.
  - b. Only when interrelationships are too complex or there is uncertainty regarding the values that could be assumed by the variables or both, we would have to resort to simulation.
14. Simplex method of solving linear programming
  - a. It involves an iterative procedure for arriving at the optimal solution
  - b. Slack variables are used to represent the unused resources
  - c. Slack variables make zero contribution towards the objective to be achieved
  - d. The  $Z_j - C_j$  values indicate whether the solution is optimal or not.
15. Geometric mean is the appropriate measure for computing the average rate of change of quantities that change over time.
16. Bayes' theorem helps the statistician to calculate posterior (or revised) probability.
17. The pattern "Hugging the center line" indicates that the deviations are minor and uniform in nature. This indicates that the variation has been reduced to a great extent. So for any quality control manager this pattern is generally desirable.
18. The standard error of the estimate of a regression line is the measure of the variability of the observed values around the regression line.
19. Octiles, deciles, percentiles are the measures of central values.

20. Concepts of probability
  - a. Experiment is an operation that produces outcomes which can be observed
  - b. Outcome is the result of an experiment
  - c. Sample space is the totality of all possible outcomes of an experiment
  - d. Collectively exhaustive is a list of all possible events of an experiment
  - e. Mutually exclusive is the events, that can not occur at the same time when the experiment performed.
21. If all the items of data are increased or decreased by the same quantity, the variance which is the square of standard deviation does not change because the standard deviation does not change if all the items of data are increased or decreased by the same quantity.
22. A type II error is committed when the null hypothesis is false but accepted.
23. If the objective function of a profit maximizing linear programming problem is parallel to an edge of the feasible region, which is in the direction of the optimal movement of the objective function then there are multiple optimal solutions to the problem.
24. In case of regret criterion, the largest regret is minimized.
25. Hurwicz criterion: The decision maker lies in between two extremes, i.e. (neither complete optimistic nor complete pessimistic) chooses the maximum of the weighted profits.
26. Coefficient of quartile deviation =  $\frac{Q3 - Q1}{Q3 + Q1}$
27. Arithmetic mean is the best measure of central tendency.
28. The following are the some of the main assumptions that are made in the construction of linear programming models:
  - a. Proportionality
  - b. Additivity
  - c. Divisibility
  - d. Certainty.
29. The following are the requirements of the linear programming problem.
  - a. Linear programming problem must have a well-defined single objective to achieve
  - b. There must be a alternative courses of action , one of which will achieve the objective .
  - c. The decision variables must be continuous in nature
  - d. Resources must be limited in supply and the achievement of the objective function is restricted by these constraints
  - e. The objective and the constraints must be linear functions.
30. In case of binomial distribution, the possible outcomes are finite in number and hence, it can be termed as a discrete probability distribution.
31. slope of the regression equation is = (Coefficient of correlation between X and Y) \* ( $\sigma_y / \sigma_x$ )
32. decision tree analysis:
  - a. Decision tree analysis is a diagrammatic representation of a decision process
  - b. Decision tree analysis is an excellent tool for making financial or number based decisions
  - c. Alternative decisions and the implications of taking those decisions can be laid and evaluated
  - d. Decision tree analysis can help in assessing the risk in making decisions concerning investment
  - e. Decision tree analysis can be used with the help of computer.
33. The process is in control according to the x charts, if the sample means are on either side of the center line or they follow a random path and are between the control limits.
34. chi-square distribution
  - a. Chi-square distribution has only one parameter
  - b. For large number of degrees of freedom the distribution approaches symmetry
  - c. The distribution is continuous
  - d. The distribution is unimodal.
35. A chi-square test of goodness of fit is used to test whether the data from a population follows a hypothesized probability distribution.

36. coefficient of determination,  $R^2 = \frac{\text{RSS(Regression sum of squares)}}{\text{TSS (Total sum of squares)}}$
37. Multicollinearity is the existence or presence of correlation among independent variables.
38. Factor reversal test and Time reversal tests are satisfied by Fisher's ideal index and it does not satisfy Circular test.
39. Paasche's price index has some downward bias. Laspeyre's price index has upward bias, Fisher's ideal price index is free from bias and Marshall-Edgeworth index closely approximates the Fisher's price index.
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