**BUS 322 S24**

**Quiz 4**

**(Optional)**

**Class Notes**

**as of 4/22/24**

**1. One-Way Analysis of Variance:** An analysis of variance design in which independent samples are for the purpose of testing whether they have equal means. A statistical procedure for testing differences the means of multiple populations. It requires for the following to be calculated: the degrees of freedom, the critical value, and the test statistic.

**2. ANOVA Assumptions for Experimental Design:**

a) the populations follow the normal distribution

b) the populations have equal standard deviations

c) the observations are independent

**3. The F-distribution:** It is used to test whether two samples are from populations having equal variances, and it is also applied when we want to compare several populations means simultaneously. The samples are randomly and independently selected. It a sampling distribution composed of sample variance ratio.It is skewed to the left and it becomes closer to the normal distribution as the number of degrees of freedom increases.

**4. F test :** a hypothesis test using the F distribution. It is used to calculate whether two independent populations have the same variability. It uses the ration of the variances of two samples that have been selected randomly from the same population or from two normally distributed populations with the same variability.

**5. Characteristics of F-distribution:**

a) there is family of F distribution

b) it is continuous

c) cannot be negative

d) it is positively skewed.

e) it is asymptotic. As the values of X increase, the F curve approaches the X-axis but never touches it.

**6. ANOVA Table :** a table format for presenting the elements of an F test.

**7. One-tailed test: :** a hypothesis test in which rejection of Ho occurs for values of the test statistic in one tail (upper or lower) of its sampling distribution

**8. Two-tailed test:** a hypothesis test in which rejection of Ho occurs for values of the test statistic in either tail of its sampling. There are two tails, the upper and the lower. For each tail use α/2 as the level of significance. The formulas TINV or NORMSINV can be used to calculate the critical values.

**9. t-distribution:** A family of probability distributions that can be used to develop an interval estimate of a population mean whenever the population standard deviation is unknown and is estimated by the sample standard deviation.

**10. Degrees of Freedom:** A parameter of the t-distribution. It consists of the number of independent data values available to estimate the value of $Σ$ of population It can be calculated either by using the “n-k” or “n-1” depending on the problem at hand.

**11. Hypothesis:** A statement about a population parameter subject to verification.

**12. Hypothesis Testing:** A procedure based on sample evidence and probability theory to determine whether the hypothesis is a reasonable statement. Same as Research Hypothesis. Some steps of the process are define Ho, define Ha, select α.

**13. Null Hypothesis:** Ho is a statement about the value of a population parameter developed for the purpose of testing numerical evidence. Always contains the equal sign. The Ho will not be changed unless there is a sufficient evidence to do so.

**14. Alternate Hypothesis:** Ha is a statement that is accepted if the sample data provide sufficient evidence that the null hypothesis is false. It never contains the equal sign. The Ha is also called the Research Hypothesis.

**15. Level of Significance:** The probability of rejecting the null hypothesis when it is true. It is represented by the symbol α.

**16. Test Statistic:** A value, calculated from sample information necessary for determining whether there is enough evidence to reject Ho. This will always be one number.

**17. Critical Value:** The dividing point between the region where the null hypothesis is rejected and the region where it is not rejected. One-tailed test will have one critical value, two tailed test will have two critical values

**18. Large sample:** n ≥ 30. If you know the value of $Σ$ and the sample size is large use the z distribution.

**19. Sampling distribution**: is a distribution of the possible values of statistics for a given size of a random sample selected from the population.

**20. Chi-square distribution:** can be used to conduct a test to determine whether sample data that were collected “ fit a particular model of distribution. It is called a “goodness of fit” model. It can also be used to determine whether certain factors represented in the sample data are statistically independent.

**21. Decision theory**: is an analytic and systematic way to tackle problems. A good decision is based on logic.

**22. Six steps in decision making**: 1. Clearly define the problem at hand 2. List the possible alternatives,3. Identify the possible outcomes or states of nature,4. List the payoff (typically profit) of each combination (decision tree) of alternatives and outcomes.5. Select one of the mathematical decision theory model,6. Apply the model and make your decision.

**23. Types of Decision-making Environments**:

a) Decision making under certainty (perfect information are available)

b) Decision making under uncertainty (probabilities are not known)

c) Decision making risk (probabilities are known)

**24. Decision Making Under Uncertainty:**

a) Optimistic (Maximax)

b) Pessimistic (Maximin)

c) Criterion of realism (Hurwicz)

d) Equally likely (Laplace)

e) Maximax regret (Opportunity loss)

**25. Expected Monetary Value (EMV):** is a weighted sum of possible payoffs for each alternative.

**26.Expected Value of Perfect Information (EVPI):** places an upper bound on what to pay for information. It is a EVwPI (Expected Value with Perfect Information) minus the maximum EMV.

**27. Expected Opportunity Loss (EOL):** is the cost of not picking the best solution.

**28. Sensitivity Analysis:** investigates how our decisions might change with different input data. A process that involves determining how sensitive solution is to change in the formulation of a problem.

**29. Five Steps in Decision Tree Analysis.**

1. Define the problem

2. Structure or draw the decision tree

3. Assign probabilities to the state of nature

4.Estimate payoffs for each combination of alternatives and states on nature

5.Solve the problem by computing EMV. All outcomes and alternatives must be considered.

**30. Utility;** the overall value of the results of a decision. The EMV is not always the best approach. Utility values can replace the monetary values.

**31. Utility assessment;** assigns the worst outcome a utility of ) and the best outcome a utility of 1.

**32. Point of Indifference;** when we are indifferent the expected utilities are equal. Once the utility values have been determined, the utility curve can be constructed. The shape of the person’s utility curve depends on many factors.

**33. Alternative:** a course of action or a strategy that may be chosen by a decision maker.

**34. Coefficient of Realism:** a number from 0 to 1.When the coefficient is close to 1, the decision criterion is optimistic. When the coefficient is close to zero, the decision criterion is pessimistic.

**35. Criterion of Realism:** a decision-making criterion that uses a weighted average of the best and the worst possible payoffs for each alternative. Also called the Weighted Average Criterion.

**36. Decision Making under Certainty:** a decision-making environment in which the future outcomes or states of nature are known.

**37. Decision Making under Risk:** a decision-making environment in which several outcomes or states of nature may occur as a result of a decision or alternative. The probabilities of the outcomes or states of nature are known.

**38. Decision Making under Uncertainty:** a decision-making environment in which several outcomes or states of nature may occur. The probabilities of these outcomes, however, are unknown.

**39. Equally likely:** a decision criterion that places an equal weight on all states of nature.

**40. Maximax:** an optimistic decision-making criterion. This selects the alternative with the highest possible return.

**41. Maximin:** a pessimistic decision-making criterion. This alternative maximizes the minimum payoff. It selects the alternative with the best of the worst possible payoffs.

**42. Maximax Regret:** a criterion that minimizes the maximum opportunity loss.

**43. Opportunity Loss:** the amount you would lose by not picking the best alternative. For any state of nature, this is the difference between the consequences of any alternative and the best possible alternative. Also called a Regret.

**44. Risk Seeker:** a person who seeks risks. On the utility curve, as the monetary value increases, the utility increases at an increasing rate. The decision maker gets more pleasure for a greater risk and higher potential return.

**45. Risk Avoider:** a person who avoids risk. On the utility curve, as the monetary value increases, the utility increases at a decreasing rate. The decision maker gets less utility for a greater risk and a greater potential returns.

**46. Standard Gamble:** the process used to determine utility values.

**47. State of Nature:** an outcome or occurrence over which the decision-maker has little or no control.

**48. Flow Diagram, or Flowchart:** a graphical means of presenting the logic of a simulation model. It is a tool that helps in writing a simulation computer program.

**49. Monte Carlo Simulation:**  Simulations that experiment with probabilistic elements of a system by generating random numbers to create values for these elements.

**50. Operational Gaming:** the use of simulation in competitive situations such as military games and business or management games.

**51.Simulation:** a quantitative analysis technique that involves building a mathematical model that represents a real-world situation. The model is then experimented with to estimate the effects of various actions and decisions.

**52. System Simulation:** simulation models that deal with the dynamic of large organizational or governmental systems.

**53.Validation:** the process of comparing a model to the real system that is internally consistent and following the logic of the conceptual model.

**54.Random Numbers:** a number whose digits are selected completely at random.

**55. Algorithm:** a set of logical and mathematical operations performed in a specific sequence.

**56. Deterministic Model:** a model in which all values used in the model are known with complete certainty.

**57. Mathematical Model:** a model that uses mathematical equations and statements to represent the relationships within the model.

**58. Model:** a representation of reality or of a real-life situation. Both quantitative and qualitative factors must be considered.

**59. Probabilistic Model:** a model in which all values used in the model are not known with certainty but rather involve some chance or risk, often measured as a probability values.

**60. Algorithm:** a set of logical and mathematical operations performed in a specific sequence.

**61. Problem:** a statement, which should come from a manager, that indicates a problem to be solved or an objective or a goal to be reached.

**62. Stochastic Model:** another name for a probabilistic model.

**63. Quantitative Analysis:** a scientific approach that uses

quantitative techniques as a tool in decision making.

**64. Input Data:** Data that are used in a model in arriving at the final solution. The input data and model determine the accuracy of the solution

**65. The Types of Models:** Include, physical, scale, schematic, and mathematical models.

**66. A Good Solution:** Is an outcome of following a set of mathematical operations performed in a specific sequence.