**MODULE 4: INTRODUCTION TO MULTIPLE LINEAR REGRESSION**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | Find multiple linear regression equation of Y on X1 and X2.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Y | 4 | 6 | 7 | 9 | 13 | 15 | | X1 | 15 | 12 | 8 | 6 | 4 | 3 | | X2 | 30 | 24 | 20 | 14 | 10 | 4 | |  |
| 2. | Find multiple linear regression equation of X1 on X2 and X3.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X1 | 3 | 4 | 5 | 6 | 7 | 8 | | X2 | 24 | 5 | 6 | 7 | 4 | 2 | | X3 | 12 | 15 | 15 | 12 | 10 | 7 | |  |
| 3. | Given the following, determine the regression equation of:  i) X1 on X2 and X3  ii) X2 on X1 and X3  r12 = 0.8, r13 = 0.6, r23 = 0.5, σ1 = 10, σ2 = 8, σ3 = 5. |  |
| 4. | In a trivariate distribution,  r12 = 0.7, r13 = r23 = 0.5  σ1 = 2, σ2 = σ3 = 3.  Find: b12.3 and b13.2 |  |
| 5. | Explain –R2 – MAE – MAPE |  |
| 6. | Explain order of coefficient regression |  |
| 7. | Find y when x1=10 & x2=6 from least square regression equation of y in x1 & x2 for the following   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Y | 90 | 72 | 54 | 42 | 30 | 12 | | X1 | 3 | 5 | 6 | 8 | 12 | 14 | | X2 | 16 | 10 | 7 | 4 | 3 | 2 | |  |
| 8. | Explain multiple regression and types of multiple regression and its application. |  |
| 9. | Explain test of significance. |  |
| 10. | What do you understand by MLR model? Explain few situations in which it can be used. |  |
| 11. | What does the significance of a partial regression coefficient indicate? |  |
| 12. | Explain the term coefficient of determination. Also give its use in fitting of a MLR equation. |  |
| 13. | How will you decide about the relative importance of various independent variables? |  |
| 14. | Explain partial regression coefficient. |  |
| 15. | Numerical on MLR.  Find the multiple linear regression equation of X1 on X2 and X3 from the following data relating to three variables given below:  X1 4 6 7 8 9 13  X2 15 12 8 6 4 3  X3 30 24 20 14 10 4 |  |
| 16. | Given the following, determine the regression equation of X2 on X1 and X3                          r12 = 0.8,  r13 = 0.6, r23 = 0.5, σ1 = 10, σ = 8, σ3 = 5. |  |
| 17. | Given r12 = 0.28, r23 = 0.49, r31 = 0.51, 𝜎1 = 2.7, 𝜎2 = 2.4, 𝜎3 = 2.7.  Find the regression equation  of X3 on X1 and X2. |  |
| 18. | Fit in the linear regression equation of Y on X1 and X2 | B L Agarwal/  S C Gupta |
|  | Considering that the dry weight of plants depend on root length and shoot length, (i) fit in the linear regression equation of Y on X1 and X2 (ii) estimate Y for given X1 =12 and X2=10, (iii) find the value of R and interpret it. |  |
| 19. | Discuss briefly the testing the significance of Overall fit of the model and testing the significance of each partial regression coefficient |  |
| 20. | The data with regard to the output of gram and cost of seed and labour per hectare at ten farmers’ fields, are as given below   |  |  |  |  | | --- | --- | --- | --- | | Sr No | Cost of produce (Y)  (RS/ha) | Cost of Seed (X1)  (RS/ha) | Cost of Labour (Y)  (RS/ha) | | 1 | 1127 | 235 | 128 | | 2 | 840 | 236 | 82 | | 3 | 735 | 238 | 205 | | 4 | 570 | 241 | 71 | | 5 | 462 | 238 | 110 | | 6 | 614 | 233 | 130 | | 7 | 916 | 235 | 200 | | 8 | 460 | 190 | 170 | | 9 | 1540 | 235 | 180 | | 10 | 1065 | 243 | 165 | | 1. Fit the regression equation Y^=b0+b1X1+b2X2 2. Estimate the cost of produce per hectare given that X1=230 and X2=125 3. Test the significance of partial regression coefficients 4. Find the partial correlation coefficient rYX2X1 | | | | | Basic Statistics B. L Agarwal, pg. no. 468 |
| 21. | What do you understand by multiple linear regression models? Explain a few situations in which it can be used. | Basic Statistics B. L Agarwal, pg. no. 442 |
| 22. | Give the method of fitting of a multiple linear regression equation by the least square method. | Basic Statistics B. L Agarwal, pg. no. 443 |
| 23. | What does the significance of a partial regression coefficient indicate? | Basic Statistics B. L Agarwal, pg. no. 451 |
| 24. | Define following terms and give their range.  (a)Partial regression coefficient  (b) Partial correlation coefficient  (c) Multiple correlation coefficient | Basic Statistics B. L Agarwal, pg. no. 443,451 |
| 25. | Explain the term coefficient of determination. Also give its use in fitting of a multiple linear regression equation. | <https://www.britannica.com/science/coefficient-of-determination> |
| 26. | How will you decide about the relative importance of various independent variables? | <https://statisticsbyjim.com/regression/identifying-important-independent-variables/> |
| 27. | The following table gives the data with regard to the cost of produce of wheat per hectare and the cost of inputs in rupees at different farmer’s fields.   |  |  |  |  | | --- | --- | --- | --- | | Sr no. | Output(Y) | Seed(X1) | Labour(X2) | | 1 | 2905 | 185 | 475 | | 2 | 2850 | 198 | 336 | | 3 | 2910 | 197 | 242 | | 4 | 3050 | 160 | 245 | | 5 | 2845 | 195 | 255 | | 6 | 2960 | 212 | 235 | | 7 | 3012 | 155 | 275 | | 8 | 3108 | 165 | 280 | | 9 | 3197 | 185 | 215 | | 10 | 2278 | 216 | 376 |  1. Fit the linear regression equation of Y on X1, X2 and X3. 2. Test the significance of partial regression coefficient by F-test. 3. Test the significance of partial regression coefficient of X3. 4. Estimate the cost of product if the inputs in rupees are X1=160, X2=250 and X2=560. 5. Find the coefficient of determination and interpret it. 6. Find the multiple correlation coefficients. | Basic Statistics B. L Agarwal, pg. no. 462 |
| 28. | Explain the Test of Significance for overall fit of the model and for individual coefficients | Basic Statistics B. L Agarwal, pg. no. 447 |
| 29. | Explain Multiple Linear Regression with two independent variables. | Basic Statistics B. L Agarwal, pg. no. 443 |
| 30. | Explain Multiple Linear regression with appropriate example | B. L. Aggarwal |
| 31. | Computation of coefficient. As a theory question or numerical based on computation of coefficients | B. L. Aggarwal |
| 32. | Numerical on computing the regression coefficients | S.P. Gupta |
| 33. | Numerical on computing the partial regression coefficients | S.P. Gupta |
| 34. | Explain Multilinear Regression in detail. | S.P. Gupta |
| 35. |  |  |
| 36. |  |  |
| 37. | Explain Assumptions of Multiple Linear Regression |  |
| 38. | Multiple Regression Model and Interpretation of its coefficients | <https://drive.google.com/file/d/1nHUOwxWe3VbVkeYWrJI5oA7gpEqVZ0ih/view?usp=sharing> |
| 39. | Multiple Regression (Derivation) | <https://drive.google.com/file/d/176fv_ium_dVB3soBNSEQg9RazgdAFZfE/view?usp=sharing> |
| 40. | Mathematical Notation (Yule’s Notation) | <https://drive.google.com/file/d/1r8znbsPFED9rI1uw_ZSr_j3BXyvmX-ZM/view?usp=sharing> |
| 41. | Method 1 | <https://drive.google.com/file/d/1L8m4q0IBZVeorBaUIuJIW1T9tuckA4Sk/view?usp=sharing> |
| 42. | Method 2 | <https://drive.google.com/file/d/190pPgo02F_DJFu7fN7W0g5QjvJn2Isq_/view?usp=sharing> |
| 43. | Method 3 | <https://drive.google.com/file/d/1lzkLjYeiUShbuwYAjLwPFHUFn5efUGCN/view?usp=sharing> |
| 44. | Sums on MLR & Partial Regression Coefficients | <https://drive.google.com/file/d/11k7V-65_qLbA3KnJ6zGrY6YVfmiR_t2H/view?usp=sharing> |
| 45. | Multiple Regression by Least Square Method  a) X1 on X2 and X3  b) X2 on X1 and X3  c) X3 on X1 and X2 | <https://drive.google.com/file/d/1WUmwcxAhhRvsUWx0lTMuX_NA0B0uu4GK/view?usp=sharing> |
| 46. | Testing Significance: Overall Significance of the Overall Fit of the Model & Testing of Individual Regression Coefficients | <https://drive.google.com/file/d/14e6ZuJbq7CZz30sGNFXT9jrf9L-MzU5c/view?usp=sharing> |
| 47. | Multiple Linear regression to calculate intercept and slope parameter. [Restricted to only two independent variable]    Y is dependent parameter , X1 and X2 are independent parameter |  |
| 48. | Derivation of R2 and Adjusted R2 for Multiple Linear Regression |  |
| 49. | Comment on the result of Multiple linear Regression in terms of various test results. |  |
| 50. | What is the effect of R2 and Adjusted R2 for addition of new variable in multiple linear regression. |  |
| 51. | Obtain Partial correlation coefficients for following data |  |

**MODULE 5: STATISTICAL INFERENCE**

|  |  |  |
| --- | --- | --- |
| 1. | Explain Multiple Regression |  |
| 2. | A random sample of n=6 has the element 6,10,13,14,18,20. Compute the following the following point estimation  1) Population mean  2) Population standard deviation  3) The standard error of mean |  |
| 3. | Explain Random Sample |  |
| 4. | Explain Characteristics of Estimation |  |
| 5. | Draw the Inference of the following: |  |
| 6. | Draw the Inference of the following: | <https://www.probabilitycourse.com/chapter8/8_2_1_evaluating_estimators.php>  <https://web.stanford.edu/class/archive/cs/cs109/cs109.1218/files/student_drive/7.3.pdf>  <https://www.probabilitycourse.com/chapter8/8_2_3_max_likelihood_estimation.php> |
| 7. | 1. Discuss in brief about Method of Moments estimators. 2. Let x1,x2,x3……xn be theiid samples from X~N( theta 1, theta 2).   Determine the MoM estimator of the vector theta =( theta 1, theta 2), where theta 1 is mean and theta 2 is variance | Refer the above URLs |
| 8. |  | Refer the above URLs |
| 9. |  | Refer the above URLs |
| 10. |  | Refer the above URLs |
| 11. |  | Refer the above URLs |
| 12. | Explain Point Estimation in detail with its properties. | <https://docs.google.com/presentation/d/1s2hkwdv_ByqpJtokkMV0UJM9Xwr_Rr7kCl4qYlE4jhk/edit?usp=sharing> |
| 13. | Explain Nyman fisher factorization theorem | <https://online.stat.psu.edu/stat415/lesson/26/26.1>  <https://online.stat.psu.edu/stat415/lesson/26/26.2> |
| 14. | Let X1,X2,…….Xn be a random . sample show that the sample mean  is an unbiased estimator of | <https://docs.google.com/presentation/d/1s2hkwdv_ByqpJtokkMV0UJM9Xwr_Rr7kCl4qYlE4jhk/edit?usp=sharing> |
| 15. | What are the Advantages and Disadvantages of Maximum Likelihood Estimation? | <https://www.aptech.com/blog/beginners-guide-to-maximum-likelihood-estimation-in-gauss/> |
| 16. | Analyse the frequency distribution by method of moments   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 2 | 3 | 4 | 5 | 6 | | f | 1 | 3 | 7 | 3 | 1 | | 9.17 SP Gupta - 8 |
| 17. | Calculate the first moment about the mean and also the value of β1 and β2 from the followingdata:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | | No. of students | 8 | 12 | 20 | 30 | 15 | 10 | 5 | | 9.17 SP Gupta - 9 |
| 18. | A random sample n=6 has the elements 6,10,13,14,18,20 compute a point estimation of  i. Population mean  ii. The population std. deviation  iii. The std. error of the mean | <https://drive.google.com/file/d/1O16ufadjgOyuJ18ipPCnQrpGLa50qnEY/view?usp=sharing> |
| 19. | Explain method of maximum likelihood with its advantageous and disadvantages | <https://www.itl.nist.gov/div898/handbook/eda/section3/eda3652.htm>  <https://www.aptech.com/blog/beginners-guide-to-maximum-likelihood-estimation-in-gauss/> |
| 20. | Derive Maximum Likelihood Estimation for Normal distributed data | <https://www.youtube.com/watch?v=Dn6b9fCIUpM> |
| 21. | Explain in details moments and its type | <https://docs.google.com/presentation/d/1s2hkwdv_ByqpJtokkMV0UJM9Xwr_Rr7kCl4qYlE4jhk/edit?usp=sharing> |
| 22. | Theory question on the difference between point estimate. Difference between a sample and a population | B.L. Aggarwal |
| 23. | Explain Point Estimation |  |
| 24. | Explain Interval Estimate |  |
| 25. | Explain the following Properties of Point Estimators  1. Bias  2. Consistency  3. Unbiasedness  4. Efficiency |  |
| 26. | Explain Moments (method of point estimation) |  |
| 27. | Explain maximum likelihood (method of point estimation) |  |
| 28. | A random sample of n=6 has the elements 6, 10, 13,14,18,20.  Compute a point estimate of  1. Population mean  2. Population standard deviation |  |
| 29. | *X* is a random variable with mean μ and variance σ2. Let *X*1, *X*2,…,*Xn* be a random  sample of size *n*. Show that the samples mean (*X*-bar) is an unbiased estimator of μ. |  |
| 30. | Show that the sample variance (*S*2) is an unbiased estimator of σ2. |  |
| 31. | Explain different types of Statistical Inference |  |
| 32. | Statistical inference, Parameter and Statistics | <https://drive.google.com/file/d/1zjBDdFAiz0qAeOCvCe6pUeuPO5ymdeL_/view?usp=sharing> |
| <https://drive.google.com/file/d/1dW2rbF0nfTY25mMiOXVRz8x6APSFtYy5/view?usp=sharing> |
| 33. | Sums on Point Estimate of the Population mean, Population Std Deviation, and Std. Error of the Estimate mean | <https://drive.google.com/file/d/1zjBDdFAiz0qAeOCvCe6pUeuPO5ymdeL_/view?usp=sharing> |
| 34. | Point Estimation Numerical (Biased and Unbiased) | <https://drive.google.com/file/d/1EVb4Nl6La3f0qrtKQ7QY6U3fGqkqekaD/view?usp=sharing> |
| <https://drive.google.com/file/d/1DUFF3zfv9QRqwvcnndoSnZzwPZLY6R61/view?usp=sharing> |
| 35. | Maximum Likelihood Estimate | <https://drive.google.com/file/d/1bqk_GnQ51Zd48Y7Upi-9eVHEIK66DWy0/view?usp=sharing> |
| 36. | Define Estimate, Estimator with examples |  |
| 37. | Explain classification of Inference |  |
| 38. | Explain Point Estimation Property Unbiasedness with example |  |
| 39. | Explain Point Estimation Property Consistency with example |  |
| 40. | Explain Point Estimation Property Efficiency with example |  |
| 41. | Explain Point Estimation Property Sufficiency with example |  |
| 42. | What is difference between probability and Maximum Likelihood estimation |  |
| 43. | Derive Maximum Likelihood estimation for Normal Distributed Data |  |
| 44. | Derive Maximum Likelihood estimation for Binomial Distributed Data |  |
| 45. | Derive Maximum Likelihood estimation for Exponential Distributed Data |  |
| 46. | Find for population parameter |  |
| 47. |  |  |
|  | For variance |  |
| 48. | Prove that |  |
| 49. |  |  |
| 50. |  |  |
| 51. | Prove that mean and proportions are unbiased estimator |  |
| 52. | Prove that S2 (s is capital) is biased estimator while s2 (s is small)biased estimator |  |
| 53. | Define Moment. Explain moment from first order to fourth order [Equations and diagrams expected] |  |

**MODULE 6: TESTS OF HYPOTHESES**

|  |  |  |
| --- | --- | --- |
| 1. | Explain the concept of hypothesis? What is null hypothesis and alternate hypothesis? |  |
| 2. | Explain in brief: Type I and Type II errors in hypothesis. |  |
| 3. | Give the difference between a one tailed test and two tailed test in hypothesis. |  |
| 4. | A random sample of size 16 has a mean 53, population has a mean of 56 and the value of t is 4. Find the value of standard error. |  |
| 5. | A medicine was found to be effective for 9 patients in 8 days on an average with standard deviation of 2.2 days. Another medicine administered to another group of 8 patients was found to be effective in 6 days on an average with standard deviation of 2.6 days. Use 5% level of significance to test the null hypothesis that the two medicines are equally effective. |  |
| 6. | In a survey of buying habits, 400 women shoppers are chosen at random in supermarket ‘A’. Their average weekly food expenditure is Rs. 250 with standard deviation of Rs. 40. For 400 women shoppers chosen at random in supermarket ‘B’, the average weekly food expenditure is Rs. 220 with standard deviation of Rs. 55. Test at 1% level of significance whether the average weekly food expenditure of the two populations of shoppers are equal. |  |
| 7. | A drug is given to 10 patients and the increase in their BP was recorded as 3,6,-2,4,-3,4,6,0,0.2. Is it reasonable to believe that the drug has no effect on change in BP? |  |
| 8. | To verify whether a course in mathematics improves performance or not, two tests were given to 12 participants, one before and one after the course. Marks of the test paper before the course were 44, 40, 61, 52, 32, 44, 70, 41, 67, 72, 53, 72. Marks of the test after the course were 53, 38, 69, 57, 46, 39, 73, 48, 73, 74, 60, 70. Determine whether the course was useful or not. |  |
| 9. | The Mean light of a sample of 10 electric bulbs is 1456 hours with a standard deviation of 423 hours. The second sample of 17 electric bulbs chosen from a different batch has a mean of 1280 hours with a standard deviation of 398 hours. Is there a significant difference between the mean of two samples? |  |
| 10. | For a random sample of 10 persons fed on diet A, the increase in the weight for a certain period was 10, 6, 16, 17, 13, 12, 8, 14, 15, 9 kgs. For another sample of 12 persons fed on diet B, the increase in the weights for the same period was 7, 13, 22, 17, 15, 12, 14, 18, 8, 21, 23, 10 kgs. Test whether the two diets differ significantly as regards to increase in weights. |  |
| 11. | A random sample of 10 given mean 6.2 and standard deviation of 10.24. Can it be reasonably regarded as a sample drawn from a large population having mean 5.4? |  |
| 12. | A random sample of size 16 has a mean of 53. Sum of squares of deviation observed from their mean is 135. Can this sample be regarded as drawn from the population of mean of 56. |  |
| 13. | Ten individuals are chosen at random from a population and their heights are found in inches. The heights are 63, 63, 64, 65, 66, 69, 69, 70, 70, 71. Discuss the suggestion that the mean and height of population is 65. Given for 9 degrees of freedom at 5% level of significance the value of t s 2.262. |  |
| 14. | A machine is designed to pack edible oil in tins of 5 kgs. A random sample of 10 tins gave the average weight of a tin as 4.8 kg and standard deviation of 2 kg. Is the machine working properly? Given for 9 degrees of freedom at 5% level of significance the value of t is 2.262. |  |
| 15. | Cardiac patients were implanted pacemakers to control heartbeats. A plastic connector module mounts on top of pacemakers. Assuming standard deviation of 0.0015 inches and normal distribution, find 95% confidence level for mean size of the connector module.  A random sample of 75 modules has an average of 0.31 inches. How large a sample is needed if we wish to be 95% confident that the sample mean will be within 0.0005 inches from the true mean? |  |
| 16. | Compare & Explain Null and Alternative Hypothesis |  |
| 17. | Explain Neyman-Pearson Lemma |  |
| 18. | Find the median of the following distribution cross profit as   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | % of sale | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | | No of comp | 22 | 38 | 46 | 35 | 20 | |  |
| 19. | Perform ‘ t’ Test for the hypothesis  Note: Value of t tabulated = 2.567 at α = 0.01 | B L Agarwal/  S C Gupta |
| 20. | On the basis of the sample data, can it be concluded that the mean income of a person in this class of people is Rs. 10,000 per year? Note: Value of z tabulated = 1.96 at α = 0.05 |  |
| 21. | Discuss your understanding about Null and Alternative Hypothesis |  |
| 22. | Write a short note on Errors in Hypothesis testing. |  |
| 23. | Discuss your understanding about power of hypothesis testing and NP lemma. |  |
| 24. | Write a short note on MP and UMP tests. |  |
| 25. | What is Hypothesis? Explain Null and Alternative Hypothesis. | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.2 |
| 26. | Differentiate between Null and Alternative Hypothesis | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.2.2& 18.2.3 |
| 27. | Explain types of error in Hypothesise testing | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.2.5 |
| 28. | Explain  1.Test of significance  2.Level of significance  3.Simple hypothesis  4.Composite Hypothesis | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.2.1 |
| 29. | What is critical region? Explain | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.2.4 |
| 30. | Explain steps in solving testing of hypothesis problem | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.3 |
| 31. | What is level of significance | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.2.6 |
| 32. | The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with standard deviation of 5 months. A random sample of 6 such bulbs gave the following values  Life of bulb in months 24,26,30,20,20,18  Is the manufacturer’s claim valid at 1% level of significance?(Given that the table values of the appropriate test statistics at said level are 4.032,3.707 and 3.499 for 5, 6 and 7 degree of freedom respectively) | Statistical method by S.P. Gupta  Test of Hypothesis 3.30 |
| 33. | Explain Neyman –Pearson Lemma | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.5 |
| 34. | Explain in details MP and UMP-Test | Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor 18.4 |
| 35. | What is null and alternative hypothesis? | Extensively covered in a technical (TECHNEO) book |
| 36. | F-Test and numerical | Extensively covered in a technical (TECHNEO) book |
| 37. | Z-Test and numerical |
| 38. | t-Test and numerical |
| 39. | Explain Null and Alternative Hypothesis |  |
| 40. | Explain Type 1 and type 2 Errors in detail. |  |
| 41. | Explain One tailed and Two tailed Tests. |  |
| 42. | Explain Parametric and Non Parametric tests of hypothesis |  |
| 43. | Introduction to Hypothesis Testing | <https://drive.google.com/file/d/1ItUtRNxEk8eRUbAMeCwlwMHLMhqRn1rE/view?usp=sharing> |
| 44. | Types of Errors | <https://drive.google.com/file/d/1H-fYtLU4Nw56DKncIxYliLnAnJz1blm1/view?usp=sharing> |
| 45. | Random Variable and Probability Distribution | <https://drive.google.com/file/d/1LfgwJ9UE55R6O9iLE1ljcCuxQO_t5duN/view?usp=sharing> |
| 46. | Standard Normal Distribution and Central Limit Theorem (CLT) | <https://drive.google.com/file/d/1RTNqlQO2316G6Z_rD-itk64tfQYToVee/view?usp=sharing> |
| 47. | Hypothesis Testing:   1. Z test for Single Mean 2. Z test for Difference of Mean | <https://drive.google.com/file/d/11QzmnShyN089cz82iZc29ZRHLwDOzzHj/view?usp=sharing> |
| 48. | Hypothesis Testing:   1. Student’s ‘t’ test | <https://drive.google.com/file/d/19wCVBCK6qqgL5-m60A3rsn_IyzoH55UI/view?usp=sharing> |
| 49. | Hypothesis Testing:   1. f test | <https://drive.google.com/file/d/12svKQ7IT9dNJs2PeJETf9BC117nKnA5Z/view?usp=sharing> |
| 50. | Neyman-Pearson Lemma & MP and UMP tests | <https://drive.google.com/file/d/19s5YbKpSsopMrUEm8_GkJfM4KoZo240o/view?usp=sharing> |