Faculty of Management

Osmania University

Practical Question Bank

BBA (Business Analytics)

Semester IV w.e.f. 2021

Subject : Predictive Business Analytics

Total Marks : 35

Record : 10 Marks
Practicals : 20 Marks
Viva Voice: 5 Marks

Record Work:

1. **Input: Students must write the procedure/steps for the given question /problem.**
2. **Process: Students must write Steps/ Navigations to execute**
3. **Output: Students must show the Result/Output and interpret the results.**
4. **Use PSPP/SPSS/Excel**

Unit 1

Factor Analysis

1. A researcher wants to determine the underlying benefits consumers seek from the purchase of a toothpaste. A sample of 50 respondents was interviewed using mall-intercept interviewing. The respondents were asked to indicate their degree of agreement with the following statements using a 7 point scale (1 = strongly disagree and 7 = Strongly agree). The variables are

   V1: It is important to buy toothpaste that prevents cavities.

   V2: I like toothpaste that gives shiny teeth.

   V3: A toothpaste should strengthen your gums.

   V4: I prefer a toothpaste that freshens breath.

   V5: Prevention of tooth decay.

   V6: To have attractive teeth.

   Generate an excel sheet with the given values.

   a. Analyze this data using Principal Component Analysis, using Varimax rotation procedure.
   b. Interpret the factors extracted.
   c. Calculate the factor scores for each respondent.
   d. Examine the model fit.

2. In a pretest, data on Nike were obtained from 45 respondents. The data consists of gender, usage, awareness, attitude, preference, intention, loyalty toward Nike of a sample of Nike Users. The usage has been coded as 1,2,or 3 representing light, medium or heavy users. The gender has been coded as

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1 for females, 2 for males and 3 for transgenders. Awareness , attitude, preference, intention and loyalty are measured on 7-point Likert scale (1 = Very Unfavourable , 7 = Very Favourable). Consider only awareness , attitude, preference, intention and loyalty

toward Nike Products. Generate an excel sheet with the above details.

a. Analyze the data using Principal Axis Factor analysis.
b. Interpret the factors extracted.
c. Calculate the factor scores for each respondent.
d. Examine the model fit.

3. In a study of the relationship between household behaviour and shopping behaviour, data on the following lifestyle statements were obtained on a 7-point scale (1 = disagree, 7 = Agree)

V1: I would rather spend a quiet evening at home than go out to a party.

V2: I always check prices, even on small items.

V3: Magazines are more interesting than movies.

V4: I would not buy products advertised on billboards.

V5: I am a home person.

V6: I save and cash coupons.

V7: Companies waste a lot of money on advertising.

Generate an excel sheet with the given details.

a. Analyze this data using principal component analysis using the equimax rotation procedure.
b. Interpret the factors extracted.
c. Calculate factor scores for each respondent.
d. Examine the model fit.

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4. The school system of a major city wanted to determine the characteristics of a great teacher, and so they asked 120 students to rate the importance of each of the following 9 criteria using a Likert scale of 1 to 10 with 10 representing that a particular characteristic is extremely important and 1 representing that the characteristic is not important.

1. Setting high expectations for the students
2. Entertaining
3. Able to communicate effectively
4. Having expertise in their subject
5. Able to motivate
6. Caring
7. Charismatic
8. Having a passion for teaching
9. Friendly and easy-going

a. Prepare a cross tabulation table.
b. Prepare descriptive statistics table.
c. Prepare correlation matrix
d. Conduct factor analysis Using PCA.
   Analyze the data for using Principal component analysis.
e. Interpret the results.

Unit 2:
Hypothesis Testing

5. One-Sample t-Test:

In the population, the average IQ is 100. A team of scientists wants to test a new medication to see if it has either a positive or negative effect on intelligence, or no effect at all. A sample of 30 participants who have taken the medication has a mean of 140 with a standard deviation of 20. Did the medication affect intelligence.

a. Define Null and Alternate Hypothesis
b. State Alpha
c. Calculate Degrees of Freedom
d. State Decision Rule
e. Calculate Test Statistic
f. State Results
g. State Conclusion

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6. Life of a random sample of 10 CFL bulbs out of a pack of 50 bulbs carton shows the following readings. Test at1% level of significance if the life of bulbs is 4000 hours.(Population normal and finite, sample size may be large or small, Ha may be one sided or two sided, N is the size of population – one sample t-test

Life of 10 CFL Bulbs										
Item	1	2	3	4	5	6	7	8	9	10
Life ('000 Hours)	3.8	4.5	4	4	5.3	4.2	3.9	4.5	4.3	5.5

a. Define Null and Alternate Hypothesis.
b. State Alpha
c. Calculate Degrees of Freedom
d. State Decision Rule
e. Calculate Test Statistic
f. State the Results
g. Interpret the results.

7. The passport office claims that passport applications are processed within 30 days of submitting the application form along with all necessary documents. The table below shows the processing times of 40 passport applicants. The population standard deviation of the processing time is 12.5 days.

Processing time of Passport Applications									
16	28	29	27	16	34	28	21	30	24
18	41	37	35	23	25	24	28	23	31
22	21	33	16	19	32	32	24	35	29
24	38	27	24	25	26	32	35	22	28

a. Conduct a hypothesis test at significance level α = 0.05 to verify the claim made by the passport office.
b. Draw the normal distribution curve to show the significance of null Hypothesis.

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8. A survey is conducted on stress levels between two groups A and B having 10 respondents.

Stress Levels of Two Groups															
Respondent	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Group A	16	17	11	16	14	17	8	14	12	17	9	6	10	7	8
Group B	10	6	15	13	`14	15	14	12	9	12	15	13	10	8	9

a. Define the Null and Alternate Hypothesis.
b. Define the confidence interval.
c. Give the summary of the data.
d. Calculate the t-test (one tail)
e. Define the p-value. Interpret the results.
f. Interpret the results.

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9. 12 students were given intensive coaching and 5 tests were conducted in a month. The scores of tests 1 and 5 were given below. For α = 0.05 level of significance, answer the following,

Marks of the students in Test 1 and Test 5 consecutive tests																		
Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Marks in test 1	30	55	58	33	27	50	35	49	28	34	33	43	64	61	65	63	51	53
Marks in test 5	31	34	32	38	62	54	63	48	61	37	68	66	62	54	51	39	67	56

a. Do the data indicate any improvement in the scores obtained in tests 1 through 5.
b. Define null and alternate hypothesis.
c. What is the critical value and Degrees of Freedom
d. Interpret the values.

Paired sample test

10. The following table gives the scores of a group of students before and after training.

Average scores of a group of 20 students before and after training																				
S. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Before training	470	354	496	351	349	449	378	359	469	329	389	497	493	268	445	287	338	271	412	335
After training	408	439	321	437	335	344	318	492	531	417	358	391	398	394	508	399	345	341	326	467

a. Mention the degrees of freedom, confidence interval and t-stat.
b. Conduct a paired t-test to check whether the performance of the students after the training is greater than the performance before training at confidence (α = 0.05)
c. Interpret the result.
d. What is the significance of p value and what are your inferences.

11. As a controller of budget you are presented with the following data for budget variances (in Rs. 000's)

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BUDGET VARIANCES														
Department	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Budgeted sales	673	983	1070	913	624	955	953	1011	871	644	982	1032	1104	712
Actual Sales	1076	776	901	886	971	840	773	987	778	823	595	564	617	877

a. Is there any reason that achievements against budgets are slipping? Take α = 0.05 level of significance.

12. Hypothesis testing for correlation coefficients

An organization wants to see if there is any correlation between the age of employees and the number of sick leaves on the basis of the following data.

Age and No. of Leaves										
Age (in Yrs)	30	32	35	40	48	50	52	55	58	60
No. of Sick leaves	1	5	2	5	6	4	6	3	3	4

a. Define the hypothesis.
b. What is the value of correlation coefficient.
c. How do you test the hypothesis.
d. At 5% level of significance test the hypothesis for correlation coefficient.
e. Interpret your results.

F-Test

13. The following figures relate to the number of units of an item produced per shift by two workers A and B for a number of days.

Units of Items produced per shift by A & B											
A	19	22	24	27	24	18	20	19	25		
B	26	37	40	35	30	30	40	26	30	35	45

a. State the Hypothesis
b. Can it be inferred that worker A is more stable compared to worker B? Answer using the F-test at 5 % level of significance.
c. Interpret your result.
d. What are the degrees of freedom for A and B.
e. What are inferences if it is one tail test and if it is two tail test.

14. Two samples are drawn from two normal populations. Test whether the two samples have the same variance at 5% level of significance.

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Samples from normal distributions										
Sample 1	60	65	71	74	76	82	85	87		
Sample 2	62	66	67	85	78	63	85	86	88	91

15. An Australian Fair Work Commission survey of 1,134 employees across various industries gathered data on key drivers of job satisfaction. The most important aspect in determining employee satisfaction was collected by industry and organized into the table below. At the 0.05 level of significance, is there evidence of a significant relationship between the most important aspect in determining employee satisfaction and industry?

Most Important aspect in determining employee statisfaction						
Industry	**Flexibility**	**Freedom**	**Total pay**	**Job Security**	**Work itself**	**Hours worked**
Loadging and food services	61	19	25	21	25	14
Education/Training	71	31	25	20	51	19
Financial Services	30	9	10	14	15	4
Health care and social assistance	93	31	29	40	69	13
Communications	32	9	13	8	18	1
Retail trade	92	39	54	58	47	24

16. The following are measurements of performance obtained after training 4 groups by different methods.

Performance results after training by 4 groups								
Group 1	17	19	18	15	21	19	16	14
Group 2	21	23	20	19	19			
Group 3	20	16	21	17	19	16	16	
Group 4	13	15	16	17	13	16		

Find out whether there is a significant overall differences between these 4 groups in terms of their performance after training with level of significance 0.05.

17. A movie producer is bringing out a new movie. In order to develop an advertising strategy, he wants to determine whether the movie will appeal most to a particular age group or whether it will appeal equally to all age groups. The producer takes a random sample from persons attending the preview of the new movie, and obtain the following results:

	Age Groups				
Opinion	**Under 20**	**20-39**	**40-59**	**60 and over**	**Total**
Liked the movie	146	78	48	28	300
Disliked the movie	54	22	42	22	140
Indifferent	20	10	10	20	60
Total	220	110	100	70	500

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a. State the Hypothesis.
b. State the degrees of freedom.
c. Give inferences of the data.

18. Consider the final examination scores secured by the students of different disciplines learned on three different instructional methods.

Different Ways of Learning			
Discipline	**Lecture**	**Cases**	**Problem/Discussion**
Engg D1	**61**	**80**	**77**
Business D2	**59**	**79**	**76**
Economics D3	**56**	**78**	**68**
Mathematics D4	**54**	**66**	**63**
Statistics D5	**45**	**72**	**66**

Test the null hypothesis that there is no difference in final exam scores among the three methods and five different disciplines. Test at 5% level of significance.

19. Perform a two way ANOVA on the data given below which shows four levels of price and three advertisement campaigns as treatments.

Advertising Campaign	**Price levels(in Lakhs)**			
	A	**B**	**C**	**D**
A	38	40	41	39
B	45	42	49	36
C	40	38	42	42

20. The following table gives the number of refrigerators sold by 4 sales men in three months May, June and July.

Month	**Salesman**			
	A	**B**	**C**	**D**
May	50	40	48	39
June	46	48	50	45
July	39	44	40	39

Is there any significant difference in the sales made by the four salesmen? Is there a significant difference in the sales made during different months?

Unit 3

Cluster Analysis

21. Given data points A1(2,10), A2(2,5), A3(8,4), B1(5,8), B2(7,5)B3(6,4), C1(1,2), C2(4,9) , using Euclidean distance form three clusters.

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22. Three clusters are creating using Euclidean distance, the centroid for these clusters consisting of 3 features is provided in the following table.

Cluster Analysis			
Cluster	**X1**	**X2**	**X3**
1	10	0	6
2	0	12	0
3	8	6	8

Find the optimal cluster for a new record whose feature values are $X_1 = X_2 = X_3 = 4$

23. The table given below shows the Euclidean distance between 8 Records R_1, R2 and R3 are grouped under cluster 1, Records R4, R5, and R6 are grouped under cluster 2 and records R7 and R8 are grouped under cluster 3.

Distance between records								
	R1	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**
R1	0	2	3	4	6	6	7	8
R2	2	0	4	5	6	7	8	2
R3	3	4	0	5	6	7	8	3
R4	4	5	5	0	4	6	8	4
R5	6	6	6	4	0	3	4	5
R6	5	7	7	6	3	0	3	4
R7	7	8	8	8	4	3	0	4
R8	8	2	3	4	5	4	4	0

Calculate the Silhouette distance for record 5 (R5) , comment whether R5 is in the right cluster.

24. Use K Means clustering using the three variables towards Attitude.

Attitudinal Data for clustering										
Case	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
V1	4	7	7	1	7	4	4	4	2	2
V2	6	1	4	1	3	4	5	5	3	2
V3	2	4	4	4	3	2	2	7	2	5

Based on the number of samples create the clusters with minimum distances.

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25. From the following data

Flowers Sepal Length, Sepal Width, Petal Letgth, Petal Width				
Flower	**Sepal Length**	**Sepal Width**	**Petal Length**	**Petal Width**
1	5.1	3.5	1.4	6.2
2	4.9	3	1.4	6.2
3	7	3.2	4.7	1.4
4	6.4	3.2	4.5	1.5
5	6.3	3.3	6	2.5
6	5.8	2.7	5.1	1.9

Prepare two clusters.

Table for 26 to30 Questions.
The average sales and standard deviation of some products is given below.

Sales Sample										
SKU	8000	8001	8002	8003	8004	8005	8006	8007	8008	8009
Average Sales	3423.5	2940.6	2903.3	2624.5	3549.3	3113	3299.1	3244.6	2833.7	2188.9
Standard Deviation	890.11	970.4	522.59	551.15	1029.3	902.77	1088.7	713.81	1048.47	853.67
SKU	8010	8011	8012	8013	8014	8015	8016	8017	8018	8019
Average Sales	2856.3	3410.2	2511.7	2486.4	3172.2	3028.6	3256.2	2919.6	3129.2	2694.9
Standard Deviation	714.08	613.84	803.74	472.42	951.66	1150.9	683.802	934.27	688.424	431.18

26. Find the covariances and Normalize the sales

27. Draw a scatter plot

28. Prepare 3 clusters with minimum distances

29. Use solver to find the best fit.

30. Interpret the clusters and give your inferences.

Unit 4
Time Series Analysis

31. Calculate the three month moving average from the following data.

Number of sales in each month											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
57	65	63	72	69	78	82	82	90	92	95	97

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32. Estimate the trend values using the data given by taking a four year moving average.

Year-wise Sales					
Year	Sales	Year	Sales	Year	Sales
1991	17	2001	112	2011	78
1992	67	2002	85	2012	131
1993	21	2003	25	2013	47
1994	84	2004	73	2014	108
1995	95	2005	27	2015	76
1996	95	2006	66	2016	126
1997	15	2007	77	2017	93
1998	93	2008	98	2018	49
1999	43	2009	59	2019	54
2000	34	2010	74	2020	89

33. For the above data, calculate five year moving average and fit a trend line. Forecast the sales for 2022.

34. Below are given the figures of production (in thousand quintals) of a sugar factory.

Year-wise Production										
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Production	78	85	43	54	45	66	77	98	59	74
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production	87	120	57	110	90	115	93	78	102	97

a. Fit a straight line trend to these figures.
b. Plot scatter plot and find the equation of the regression.
c. Estimate the production for 2023
d. What is the coefficient of determination.
e. What is the goodness of fit of the model.

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35. The prices of a commodity during 1998-2023 are given below. Fit a parabola to these data. Estimate the price of the commodity for the year 2024. Also plot the residuals. Find r^2. Write the regression equation and estimate the value through the equation.

Year-wise Production

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Price	100	98	94	85	45	46	47	64	95	108	110	106	108
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Price	120	117	124	128	128	130	132	139	138	145	148	152	164

36. From Yahoo Finance, select any company's monthly historical data from past 5 years and find
    a. 3 year Moving Average
    b. 5 year Moving Average
    c. Quadratic trend
    d. Fit a straight line trend
    e. Forecast the price of the stock in February 2024

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37. We are trying to predict the annual demand for widgets (DEMAND) using the following independent variables.

Price = Price of widgets(in $)

Income – Consumer income (in $)

Sub = Price of a substitute commodity (in $)

(A substitute commodity is one that can be substituted for another commodity.)

The data is collected from 1998 to 2020

Predict Annual Demand for Widgets

Year	Demand	Price($)	Income ($)	Substitute($)
1998	40	7	400	13
1999	45	8	500	24
2000	50	7	600	22
2001	55	9	600	12
2002	60	9	700	21
2003	70	6	650	18
2004	65	5	800	14
2005	65	7	750	15
2006	72	4	900	11
2007	75	5	1000	15
2008	75	8	1050	22
2009	80	3	1000	19
2010	92	8	1200	21
2011	100	6	1100	14
2012	89	8	1300	19
2013	90	4	1300	10
2014	95	8	1400	20
2015	98	3	1450	24
2016	105	3	1500	10
2017	97	4	1500	14
2018	98	4	1600	23
2019	100	9	1700	22
2020	95	4	1750	15

a. Determine the regression equation.
b. Are the signs (+) and (-) of the regression coefficients of the independent variables as one would expect? Explain briefly.
c. State and interpret the coefficient of multiple determination for this problem.
d. State and interpret the standard error of estimate.
e. Using the equation, what would you predict for DEMAND if the price of widgets was $6 consumer income was $1200, and the price of the substitute commodity is $17.

38. The new car retail sales data is given below.

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New Car Retail Sales									
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Units	39810	40081	47440	47297	49211	51479	46466	45208	44800
Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Units	46989	42161	44186	42227	45422	54075	50926	53572	5300

Using the Holt-Winters Additive Model for seasonality find the trend and forecast period 20.

39. Apply the method of link relatives to the following data and calculate seasonal indices.

Year	Quarters			
	I	II	III	IV
2010	65	58	68	64
2011	63	65	68	81
2012	68	62	71	64
2013	66	58	62	77
2014	63	61	66	65
2015	66	70	61	75
2016	63	71	70	69
2017	63	63	74	67
2018	66	67	72	65
2019	69	71	72	75
2020	60	68	75	69

40. A company estimates its sales for a particular year to be Rs. 24,00,000. The seasonal indexes for sales are

Seasonal Index			
Month	Seasonal Index	Month	Seasonal Index
Jan	75	Jul	102
Feb	80	Aug	104
Mar	98	Sep	100
Apr	128	Oct	102
May	137	Nov	82
Jun	119	Dec	73

Using this information calculate estimates of monthly sales of the company. (Assume that there is no trend)

Unit 5
Correlation Analysis and Regression Analysis

41. The following table gives indices of industrial production and number of registered unemployed people (in lakhs). Calculate the value of correlation

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coefficient. Interpret the results.

Year, Index of production and number unemployed										
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Index of Production	100	102	104	107	105	112	103	99	110	112
Number unemployed	15	12	13	11	15	12	12	19	26	28

42. Find the correlation coefficient between x and y and interpret its value.

Coefficient of Correlation													
x	57	42	40	33	42	45	42	44	40	56	44	58	52
y	10	60	30	41	29	27	28	27	34	12	18	19	29

43. The following table gives the frequency , according to the marks obtained by 67 students in an intelligence test. Measure the degree of relationship between the age and marks. Interpret the results.

Test Marks	**Age in Years**				
	18	**19**	**20**	**21**	**Total**
200-250	4	4	2	1	11
250-300	3	5	4	2	14
300-350	2	6	8	5	21
350-400	1	4	6	10	21
Total	10	19	20	18	67

44. Find the coefficient of correlation between age and sum assured (in 000's Rs.) from the following table. Interpret the result.

Age Group	**Sum Assured (in Rs.)**				
	10	**20**	**30**	**40**	**Total**
20-30	4	4	2	1	**11**
30-40	3	5	4	2	**14**
40-50	8	6	8	5	**27**
50-60	1	4	6	1	**12**
Total	**16**	**19**	**20**	**9**	**64**

45. The annual salary of (in '000 Rupees) of 50 gratuating MBA students of a business school in 2016 are their corresponding % of marks in grade X are given in the table.

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CGPA in Xth Grade and Annual Salary of 20 MBA Graduates										
S.No.	1	2	3	4	5	6	7	8	9	10
CGPA in Xth Grade	62	76	72	60	61	55	70	82	98	45
Annual Salary	2.7	3.4	3.8	2.3	3.6	2.9	5.8	6.4	4.2	4
S.No.	11	12	13	14	15	16	17	18	19	20
CGPA in Xth Grade	64	67	78	84	98	92	69	56	73	99
Annual Salary	5.6	4.3	4.5	5.6	6.3	7.1	4.5	5.3	4.5	5.6

a. Construct a scatter plot.
b. Draw a regression line.
c. Display the equation of the regression line.
d. Display R^2 for the equation.
e. Estimate the coefficient of determination.

46. The data given below explain the attitude towards the city and the duration of the residence.

Attitude towards the ctiy and duration of resudence															
Respondents	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Attitude towards the city	5	15	10	13	4	12	11	13	4	3	4	12	13	3	7
Duration of Residence	13	9	18	12	5	9	15	13	8	13	8	12	10	12	9

a. Assuming a linear relationship between attitude towards the city and duration of residence, determine regression equation.
b. Determine the regression coefficients b_0 and b_1.
c. Interpret the meaning of slope b_1 in this problem.
d. Interpret R^2 with respect to the data given.
e. Estimate the coefficient of determination.

47. In finance it is of interest to look at the relationship Y, a stock's average return and X the overall market return. The slope coefficient computed by linear regression is called stock's beta by investment analysis. A beta greater than 1 indicates that the stock is relatively sensitive to changes in the market , a beta less than 1 indicates that the stock is relatively insensitive.

Stock Average and Over all Market Return										
Y	10	12	8	15	9	11	8	10	13	11
X	11	15	3	18	10	12	6	7	18	13

A. Compute the beta.
B. Compute the standard error.
C. What is the coefficient of determination?
D. Explain the significance of F
E. Explain the significance of t-statistic.
F. Test the model to see whether it is significantly less than 1. Use $\alpha = 0.05$

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48. Consider a study that examined the business problem facing a concrete supplier of how adding fly-ash affects the strength of concrete. (fly-ash) is an inexpensive industrial waste by-product that can be used as a substitute for Portland Cement, a more expensive ingredient of concrete).
Batches of concrete were prepared in which the percentage of fly-ash ranges from 0% to 60%. Data were collected from a sample of 18 batches and organized.

% of Fly-ash and Strength of Concrete									
% of Fly-ash	**0**	**0**	**0**	**20**	**20**	**20**	**30**	**30**	**30**
Strength	4,779	4706	4350	5180	5140	4976	5110	5685	5618
% of Fly-ash	**40**	**40**	**40**	**50**	**50**	**50**	**60**	**60**	**60**
Strength	5995	5628	5897	5746	5719	5782	5895	5030	4648

a. Find the quadratic regression model for the concrete strength data.
b. Explain the linear and quadratic effect of fly-ash on strength of the concrete.
c. Explain the test for significance of the Quadratic model using F-Stat.
d. Test the significant difference between the quadratic model and linear model for testing the quadratic effect.
e. If you select the 0.05 level of significance, then explain the critical values for the t-distribution.

49. To understand the role of quality and price in influencing the patronage of drugstores, 14 major stores in a large metropolitan area were rated in terms of preference to shop, quality of merchandise and fair pricing. All the ratings were obtained on an 11 – point scale with higher numbers indicating more positive ratings.

Store No, Preference, Quality, Price of 14 drug stores										
Store No.	1	2	3	4	5	6	7	8	9	10
Preference	2	10	3	9	9	9	10	4	5	8
Quality	3	5	1	11	3	11	2	1	11	11
Price	2	11	9	6	11	10	9	7	9	2

a. Run a multiple regression analysis explaining store preference in terms of quality of merchandise and price.
b. Interpret the partial regression coefficients.
c. Determine the significance of the overall regression.
d. Determine the significance of the partial regression coefficients.
e. Do you think that multi collinearity is a problem in this case? Why or why not?

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50. The table gives the data of 30 respondents, 15 of whom are brand loyal (indicated by 1) and 15 of whom are not(indicated by 0). Attitude toward the brand, attitude toward product category and attitude toward the shopping experience are also measured. The objective is to estimate the probability of a consumer being brand loyal as a function of attitude toward the brand, the product category and shopping.

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Loyalty , Brand , Product, Shopping of 30 customers															
Loyalty	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Brand	4	6	5	7	6	3	5	5	7	7	6	5	7	5	7
Product	3	4	2	5	3	4	5	4	5	6	7	6	3	1	5
Shopping	5	4	4	5	4	5	5	2	4	4	2	4	3	4	5
Loyalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brand	3	4	2	5	4	3	3	3	4	6	3	4	3	5	1
Product	1	6	5	2	1	3	4	6	4	3	6	3	5	5	3
Shopping	3	2	2	4	3	4	5	3	2	6	3	2	2	3	2

a. Plot the scatter plot.

b. find the regression equation.

c. What are the degrees of freedom.

d. Explain R^2 and adjusted R^2

e. Explain the significance of each of the regression coefficients.

f. Of the three independent variables, which variable is more significant to predict the brand loyalty.

&&&

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