

COM 3032 Statistical Software Application in Business

Time: 03 Hours

Number of Questions: 05

Number of Pages: 06

01. AB private hospital is functioning at Batticaloa that consists of 20 employees. The details of employee are given below.

Employee No.	Job Category	Gender	Salary	Experience (Years)
1001	Doctor	Male	68000	7
1002	Doctor	Male	72000	9
1003	Nurse	Female	31000	6
1004	Clerk	Male	26000	4
1005	Nurse	Male	34000	7
1006	Doctor	Female	63000	6
1007	Doctor	Male	76000	10
1008	Lab Technologist	Female	28000	3
1009	Labour	Male	16000	4
1010	Labour	Female	15500	4
1011	Lab Technologist	Male	28000	6
1012	Nurse	Female	24000	5
1013	Nurse	Female	27000	6
1014	Clerk	Female	20000	2
1015	Labour	Male	15000	3
1016	Doctor	Male	72000	9
1017	Nurse	Female	31000	6
1018	Clerk	Male	26000	4
1019	Nurse	Male	34000	7
1020	Doctor	Female	63000	6

- I. Enter the above data into SPSS and define variables with relevant properties

- II. Record the variable of experience as follows and named as Experience_R.
- Less than 5 years
 - 5 to 8 years
 - Above 8 years
- III. Find frequencies of the following variables.
- a. Job Category
 - b. Gender
 - c. Experience_R
- IV. Construct frequency table for salary with first cut point and class width Rs.10,000; and put the name of the new variable as Salary_N.
- V. Draw the following graph for the variables mentioned.
- a. Histogram and Box plot for Salary
 - b. Bar chart for Job category
 - c. Bar chart for Job category and mean value of Salary
 - d. Population pyramid graph for Job category split by Gender
 - e. Stem and Leaf Display for Experience
- VI. Find descriptive statistics for Experience and interpret the skewness of the distribution.
- VII. Cross-tabulate Salary_N by Job category.
- X. Using case summaries, cross-tabulate Salary by Job category with the statistics of mean, median, standard deviation, skewness and kurtosis.

(Total: 35 Marks)

02. I. Identify the appropriate test for the following context.

Data Source	Parametric Distribution	Non parametric Distribution
One sample	a.....	Binomial Test
Two samples	Independent Sample T test	b.....
Paired samples	c.....	Wilcoxon Test
More than two samples	ANOVA Test	d.....

(05 Marks)

- ii. The following data represent the amount of soft drink filled in a sample of 24 consecutive 2-litre bottles. The results, listed horizontally, were:(data file:bottles.sav)

1.89	1.95	2.01	1.98
1.98	2.01	1.97	1.94
1.93	1.95	1.96	1.99
2.01	1.96	1.97	1.94
1.94	1.97	1.98	1.96
1.99	1.96	1.90	1.95



- a. Test the normality of data.
 b. At the 0.05 level of significance, is there evidence that mean amount of soft drink filled is different from 2.0 Liters?

(10 Marks)

(Total: 15 Marks)

- i. The following three groups of reading of the velocity of a waste gas (measured in metres per second) were taken to determine whether there was any significant variation in velocity during an experiment. Group A was taken soon after the start of the experiment, Group B after one hour and Group C after two hours (data file:waste gas.sav).

Group A	6.1	6.5	6.0	6.1	6.8	6.3	7.8
Group B	7.2	7.5	8.0	6.9	6.8	6.6	7.7
Group C	7.6	8.2	6.8	7.6	7.8	7.0	7.6

Required: carry out a one way analysis of variance on these data. State your hypotheses clearly and use a 1% level of significance.

(10 Marks)

- ii. The following table shows the systolic blood pressure (mm Hg) of a random of 8 students before and after a six week training period (data file: blood pressure.sav).

Student	1	2	3	4	5	6	7	8
Before training	130	170	125	170	130	130	145	160
After training	120	163	120	135	143	136	144	120

Required: Stating clearly your hypotheses, test whether or not there is evidence that the training has reduced blood pressure. Use Wilcoxon Two related sample test with a 5% level of significance.

(10 Marks)

(Total: 20 Marks)

04. Suppose that the management of a chain of package delivery stores would like to develop a model for predicting the weekly sales (in Rs. Million) for individual stores based on the number of customers who made purchases. A random sample of 20 stores was selected from among all stores in the chain, with the following results (data file: **Weekly sales.xls**):

Customers	Weekly Sales
907	11.2
926	11.05
506	6.84
741	9.21
789	9.42
889	10.08
874	9.45
510	6.73
529	7.24
420	6.12
679	7.63
872	9.43
924	9.46
607	7.64
452	6.92
729	8.95
794	9.33
844	10.23
1010	11.77
621	7.41

- I. Use the least-squares method, state the regression equation and Interpret meaning of regression coefficients b_0 and b_1 .
- II. Predict the average weekly sales (in Rs. Millions) for stores that have 600 customers.
- III. Determine the coefficient of correlation and interpret.
- IV. Determine the coefficient of determination (r^2) and explain its meaning in this problem.
- V. Test the appropriateness of the model with justification.
- VI. At the 0.05 level of significance, is there evident linear relationship between number of customers and weekly Sales?

(Total: 15 Marks)

05. I. Srishankar is a manufacturer of particular toys in Batticaloa. He wants to develop a model to predict the sales quantity (in thousands), using competitor's price and his own price. Srishankar collects data over 10 months as shown in the following table (data file: **price.xls**):

Competitor's Price	Srishankar's Price	Quantity Sold
120	100	102
140	110	100
190	90	120
130	150	77
155	210	46
175	150	93
125	250	26
145	270	69
180	300	65
150	250	85



- State the multiple regression equation.
 - Predict the sales in quantity for the toys if he fixed price Rs.80 while competitor's price is expected to be Rs.165.
 - Interpret the meaning of the coefficient of multiple determinations in this problem.
 - Determine the adjusted r^2 and interpret it.
 - Determine whether there is a significant relationship between sales' quantity and the two explanatory variables (Competitor's Price, Srishankar's Price) at the 0.05 level of significance. **(10 Marks)**
- II. A Business statistics student wants to test the significant of difference on students commitment by gender. The SPSS output of Cross Tabulation and Chi-Square Tests are given below.

Students' Commitment by Gender

			Level of Students' Commitment			Total
			1.00 Dissatisfied Level	2.00 Marginally Satisfied Level	3.00 Satisfied Level	
Gender	1 Male	Count	7	7	7	21
		Expected Count	5.2	6.0	9.8	21.0
	2 Female	Count	8	10	21	39
		Expected Count	9.8	11.0	18.2	39.0
Total		Count	15	17	28	60
		Expected Count	15.0	17.0	28.0	60.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.413 ^a	2	.299
Likelihood Ratio	2.440	2	.295
Linear-by-Linear Association	2.227	1	.136
N of Valid Cases	60		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.25.

At 0.05 level of significance, determine whether there is a significant difference in students' commitment by gender?

(05 Marks)

(Total: 15 Marks)