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EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
FIRST YEAR SECOND SEMESTER EXAMINATION IN
BACHELOR OF BUSINESS ADMINISTRATION/ BACHELOR OF COMMERCE - 2017/2018
(January 2020) (REPEAT)
COM 2053 BUSINESS STATISTICS

culators permitted. **Time: 03 Hours**

Answer All Questions on question sheet in the given spaces.

A marketing manager of an enterprise in a particular city is trying to decide whether to introduce a new product into the market or not. Marketing of the new product will be pursued only if the acceptance rate exceeds 30%. A survey was administered to 253 consumers selected randomly in the city. 32% of the sampled consumers reported that acceptance of the new product. Identify the following for this study.

a) Population:

b) Parameter of interest:

c) Sample:

d) Statistic:

(04 Marks)

II) A survey of 1264 women asked who their most trusted shopping advisors was. The results were as follows.

Shopping advisors	**%**	**Shopping advisors**	**%**
Advertising (X_1)	7	Online user reviews (X_5)	13
Friends/family (X_2)	45	Retail web sites (X_6)	4
Manufacturer web sites (X_3)	5	Salespeople (X_7)	1
News media (X_4)	11	Other (X_8)	14

a) Describe a variable of interest in this study.

b) What is the level of measurement of the variable you mentioned in part (a).

c) Construct a bar chart to show the above data.

d) What conclusions can you reach concerning women's most trusted shopping advis

III) The number of items rejected daily by a manufacturer because of defects was recorded fo days. The results are as follows.

No. Items rejected	Frequency (f_i)	Mid-point (X_i)	$f_i \times X_i$	$f_i \times X_i^2$	Cumula frequen
5 up to 10	5				
10 up to 15	3				
15 up to 20	9				
20 up to 25	6				
25 up to 30	2				

a) Complete the above table and use it to answer the questions given below.

b) Calculate the mean number of rejected items.

Interpret the number you calculated above.

c) Calculate the median number of rejected items.

Interpret the number you calculated above.

d) Calculate the most number of rejected items.

Interpret the number you calculated above.

e) Calculate the standard deviation of rejected items.

Interpret the number you calculated above.

f) Describe the shape of the distribution of number of rejected items based on calculated above.

(To

02. I) An economist wishes to estimate the total cost of a project to offer a proper price for it. job in a fixed quantity of Rs. 12000 and a variable quantity of Rs. 300 per day of wor that the job will take between 7 and 11 days according to the following probability fu "number of days that the job will take".

x	7	8	9	10	11
P(X = x)	0.10	0.20	0.30	0.30	0.10

a) Compute the probability that the project takes 9 or 10 days.

b) Compute the expected number of days the project will take.

c) Find the standard deviation for the number of days the project will take.

d) Determine the expected cost of the project and its standard deviation.

(06 Marks)

A study by a Center for Financial Services Innovation showed that only 64% of income earners aged 15 and older had a bank account. If a random sample of 8 income earners aged 15 and older selected,

a) find the probability that all 8 have a bank account

b) find the probability that at most 1 have a bank account;

c) find the expected number of income earners aged 15 and older have a bank account;

find the standard deviation of income earners aged 15 and older have a bank account.

(05 Marks)

III) The numbers of accidents in a production facility has a Poisson distribution with mean 2.6

a) For a given month, what is the probability there will be fewer than two accidents?

b) For a given month, what is the probability there will be exactly two accidents?

c) What is the expected number of accidents in a given two months of period?

(Tot

03. I) The amount of time a bank teller spends with each customer is normally distributed with minutes and standard deviation of 0.40 minutes.

a) If a customer is selected randomly, what is the probability that the time spent wi at most 3.15 minutes?

b) If a random sample of 16 customers is selected,

write down the sampling distribution of the mean time spent per customer;

find the probability that the mean time spent per customer is in between 2.90 and 3.20 minutes

(05 Marks)

) A survey study of 1124 mothers who were currently employed full time revealed that 281 mothers were dissatisfied with their work-life balance.

a) Find the point estimate for the population proportion of mothers employed full-time who are dissatisfied with their work-life balance.

b) Find the 95% confidence interval estimate for the population proportion of mothers employed full-time who are dissatisfied with their work-life balance.

Interpret the above confidence interval:

c) Based on your answer in part (b), what would you conclude about the claim t mothers employed full-time who are dissatisfied with their work-life balance a significance?

III) The mean monthly sales of insurance agents in a particular insurance company is rupe 72. In an attempt to improve sales, a new training programme has been devised. Ten age randomly selected to participate in the programme. After the completion of training pr sales of the agents in the next month have been recorded in rupees thousands as follows.

63,	87,	95,	75,	83,	78,	69,	79,	103,	98

Do the data provide sufficient evidence at the 5% level of significance to indicate th programme is successful?

Use the above information to answer the questions from (a) to (f)

a) Find the sample mean of weekly sales.

Find the sample standard deviation of weekly sales.

b) What is the most appropriate parameter you would consider to test the claim that training programme is successful?

c) State the appropriate null and alternative hypotheses to test that the claim that the training programme is successful:

H_0:

H_1:

d) Write down the appropriate test statistic for the above hypothesis test.

e) Show the rejection region of the above hypothesis test graphically and write down the decision rule for the hypothesis testing.

f) Compute the value for the test statistic you mentioned in part (d).

g) Write down the statistical decision of the hypothesis test and explain.

h) Write down the conclusion of the test.

i) State what was the assumption you made to perform above hypothesis testing.

04. The marketing of a large supermarket chain would like to use shelf space to predict the sales random sample of 12 equal sized stores is selected. The following table lists the Shelf sp weekly sales in Rs. 100s.

Store No.	01	02	03	04	05	06	07	08	09	10
Shelf Space	5	5	5	10	10	10	15	15	15	20
Weekly Sales	16	22	14	19	24	26	23	27	28	26

Use this information to answer the questions from (a) to (h).

a) Identify the independent and dependent variables.

Independent Variable (X):

Dependent Variable (Y):

Construct a scatter plot.

Comment on the relationship between X and Y based on the scatter plot constructed above

Complete the following table and use it to answer the following questions:

Store No.	X	Y	XY	X^2	Y^2
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					

d) Calculate the correlation coefficient.

Interpretation:

e) Develop a least squares linear regression model in an attempt to predict the weekly s by the shelf space:

Compute the regression coefficient, b_1 (Slope).

Compute the slope b_0 (Intercept):

Write down the linear regression model:

Interpret the meaning of b_0 in the given problem:

Interpret the meaning of b_1 in the given problem:

Compute the coefficient of determination.

Interpret the coefficient of determination calculated above.

Predict the weekly sales for a shelf space of 16 feet.

(Total 20 Marks)

Rio Cool Spot wants to forecast quarterly demand for a particular brand ice cream for the 2020. The following table gives quarterly demand of ice cream in Kg, over the last three years.

Year	Sales			
	Q 1	Q 2	Q 3	Q 4
2017	20	40	60	15
2018	30	48	78	22
2019	52	65	95	35

Complete the table below by calculating the 4 – Quarter moving averages, Centered moving averages

of demand and Ratio to centered moving average.

Year	Quarter	Demand (Y_t)	4-Quarter Moving Average	Centered 4-Quarter Moving Average	Ratio Centered Moving Average
2017	01	20			
2017	02	40			
2017	03	60			
2017	04	15			
2018	01	30			
2018	02	48			
2018	03	78			
2018	04	22			
2019	01	52			
2019	02	65			
2019	03	95			
2019	04	35			

b) Calculate the quarterly seasonal indices using ratio to moving average method by c

following table:

Quarter	2017	2018	2019	Mean of ratio to moving averages (Seasonal index)	Adjusted Seasonal index
1					
2					
3					
4					
Total					

Find the normalization ratio to calculate the adjusted seasonal index.

The estimated demand trend equation is given by:

$$\hat{Y}_t = 26.53 + 3.10\,t\,.$$

Assuming t=1 for 2017-Quarter 1, forecast the demand of ice cream in all quarters in 2020 by completing the following table.

Quarters (2020)	Value of t	Estimated demand trend for 2020	Forecasted demand for 2020
01			
02			
03			
04			

(Total 18 Marks)