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***BUS 443: Business Analytics***

**Midterm Exam**

***Instructions:*** *Open the workbook, Midterm Exam Data.xls. You will include tabs for each mini-case below. (Other tabs for regression analysis may also be included.) Also, include one Word document with a “succinct” (no more than one page per case) written analysis of each mini case, ensuring that you answer each question. For some of the mini-cases, you can post your analysis in the Excel file via cell comments or text on a separate worksheet. Mini-cases 1, 2, 4, and 5 may only require a one or two-sentence answer.*

*You may eliminate one case from the seven choices below. When finished, upload your file(s) to Moodle by the deadline. Only submit six cases. Each case you submit is worth ~16.5 points.*

**Mini-Case 1: Estimating Optimal Prices for Appalachian Outdoor Fitters Plan**

The Appalachian Outdoor Fitters retail store, located in a popular NC vacation area, sells two popular models of GoPro cameras for vacationers who are avid hiking, white water rafting, and zip-lining enthusiasts. The sales of these products are not independent; if the price of one increases, the sales of the other increases. In economics, these two models are called substitutable products. The store wishes to establish a pricing policy to maximize revenue from these products. A study of price and sales data shows the following relationships between the quantity sold (D) and the price (P) of each model:

DA = 195-0.6PA +0.26PB

DB = 301 + 0.09PA – 0.5PB

equation to calculate the demands

1. Click on a new spreadsheet tab in your workbook. Construct a spreadsheet model that calculates the quantity sold for each GoPro device, revenues for each device (quantity sold \* price), and total revenue. Use an initial price of $200 for GoPro Model A and $300 for GoPro Model B.

|  |
| --- |
|  |

1. As a feature of your spreadsheet model, **build a two-way data table** to estimate the optimal prices for each product in order to maximize the total revenue. Vary each price from $250 to $500 in increments of $10. To maximize revenue, what is the optimal quantity of each model the shop should plan to sell?

**Total revenue = total revenue A + total revenue B**

**Build a 2 ways data table (may copy the excel file from the beginning of semester)**

**Vary the price from 250 to 500. Horizontal: model A, vertical axis: model B**

**To answer the question: have to worry about if we will run out the inventory. Figure out what quantity we need**

**Mini Case 2: Data Visualization for Donaldson Construction Equipment Company**

The Northwest regional manager of Donaldson Construction Equipment Company has conducted a three-week study to determine how store managers are allocating their time. The study collected the following data related to the percentage of time each store manager spent on the tasks of attending required meetings, preparing business reports, customer interaction, and being idle. The results of the study are found in the sheet, Donaldson Data. Do the following:

1. Use the Data Bars feature from the Quick Analysis button to highlight the idle time of the managers.
2. Create a stacked bar chart with locations along the vertical axis. Reformat the bar chart to best display these data by adding axis labels, a chart title, and so on.
3. Create a clustered bar chart with locations along the vertical axis and clusters of tasks. Reformat the bar chart to best display these data by adding axis labels, a chart title, and so on.
4. What can we infer about the differences among how store managers are allocating their time at the different locations?

Use your graph, observing

**Mini-Case 3: Linear Regression Analysis at Upper Saddle River Medical School**

A recent ten-year study conducted by a research team at the Upper Saddle River Medical School assessed how age, systolic blood pressure, and smoking relate to the risk of strokes. Assume that the data in the Health Data spreadsheet are from a portion of this study. Risk is interpreted as the probability (times 100) that the patient will have a stroke over the next ten-year period. For the smoking variable, define a dummy variable of 1 (indicating a smoker) and 0 (indicating a non-smoker). Complete the following:

1. Develop an estimated multiple regression equation that relates risk of a stroke to the person’s age, systolic blood pressure, and whether the person is a smoker.

build graph, regression equations,

y variable: the one u will predict (base on the data). Need to convert the data first: Smoker column: Yes = 1, No = 0.

Do some statistical inference, make sure the data is valid and significant

1. Is smoking a significant factor in the risk of a stroke? Explain. Use a 0.05 level of significance. Discuss p-values, F-value, and the meaning of the coefficients of each variable in your analysis.

Look at ur descriptive statistic: p-value, etc. and discuss, answer in word.

Determine what is the risk of stroke in 10 years period

1. What is the probability of a stroke over the next ten years for Samuel Connors, a 72-year old smoker who has systolic blood pressure of 175?

Find out if all the variables are significant, use the p value. If they not then eliminate that one.

**Mini-Case 4: Time Series Analysis with a Forecast for Los Angeles Building Contracts**

The values of Los Angeles building contracts (in millions of dollars) for a 12-month period follow:

240 350 230 260 280 320 220 310 240 310 240 230

1. Click on a new worksheet tab, enter the data, and construct a time series plot. What type of pattern exists in this data?

Wanna run the time series for month

1. Compare a three-month moving average forecast with an exponential smoothing forecast. Use α = 0.3. Which provides the better forecasts based on MSE?

3 moving forecast, and exponential smoothing

Then compare and pick the lower MSE, and then use that to predict the next months

1. What is the forecast for the next month using exponential smoothing with α = 0.3?

**Mini-Case 5: Time Series Analysis with a Forecast**

Consider the following time series data:

|  |  |  |
| --- | --- | --- |
| ***Year*** | ***Quarter*** | ***Data*** |
| 1 | 1 | 4 |
|  | 2 | 2 |
|  | 3 | 3 |
|  | 4 | 5 |
| 2 | 1 | 6 |
|  | 2 | 3 |
|  | 3 | 5 |
|  | 4 | 7 |
| 3 | 1 | 8 |
|  | 2 | 6 |
|  | 3 | 6 |
|  | 4 | 8 |
|  |  |  |

1. Construct a time series plot. What type of pattern exists in the data?
2. Use multiple regression model with dummy variables to develop an equation to account for **the seasonal effects** in the data. Compute the quarterly forecasts for the next year based on the model you developed.
3. Use a multiple regression model to develop an equation to account for **trend and seasonal effects** in the data. Use the dummy variables you developed in part b to capture seasonal effects and create a variable t.
4. Compute the quarterly forecasts for next year based on the model you developed in part c. Which model is more effective: the one you developed in part b or part c? Justify your answer.

**Mini-Case 6: Analyzing a Communications Industry BI Report using SAS Visual Analytics**

Go to the Teradata University Network site and access SAS Visual Analytics. Choose the Industry Sample>Communications Folder and open the Wireless call quality analysis report. (Note: The real company names and product names have been changed.) Type the answers to this mini-case in a Midterm Exam Word document. The **Overview** section summarizes network performance details – call duration, call drops and percentage of call drops – across different countries. How many dropped calls are there by switch maker? Click on the dial for each Switch Make to observe. What time of day do call drops increase?

Switches play a key role in routing call traffic. A typical facility may have switches from different manufacturers, and network managers must monitor how call traffic is going through different switches. The **Call Analysis by Switch Make** section lets you investigate call volume and call drops for different switch manufacturers. Which Carrier has the most call drops for a given switch? Which phone make has the most drops for the aSwitch with Alpha carrier?

The **Call Analysis by Cell Technology** section lets you explore where call drops are occurring by cell technology – 2G, 3G, 4G. Which cell technology has the most call drops? What times of day do call drops spike? Do results differ by region?

The **Call Analysis by Phone Maker** section lets you explore dropped calls by phone maker. Which phone models have the highest percentage of dropped calls?

**Mini-Case 7: Creating Visualizations using SAS Visual Analytics**

Go to the Teradata University Network site and access SAS Visual Analytics. Open the ORGANICS \_VISTAT data set. Create the visualizations in an appropriate type and upload each as one or more PDFs. (Note: Type your comments for this mini-case in the Midterm Exam Word document.)

1. Create an appropriate visualization that answers the question: *Which gender buys more organic products?*
2. Create a box plot that displays Affluence Grade and Age by Organics Purchase. On the Properties tab, select Show averages checkbox (shows the mean). What conclusions can you make about those who purchase organic products?
3. Determine if there is correlation between Age and Recent 12 Month Purchase. If so, comment on the direction and strength of the correlation.

May do the crosstab, from poor to rich and see how fluent/impact on eachother

Strong/weak relationship? Up or down direction

1. Study the data in this data set and create one additional visualization (not already discussed) that sheds light on a new insight about purchasers of organic products. Comment on the insight and how it provides value to this organization.

Pdf, upload, put comment in Word