**GB513: Business Analytics**

Unit 6: Assignment

**In this assignment, you will be assessed based on the following outcomes:**

**GB513-4:** Evaluate real-world situations and present solutions using statistical methods.

**PC-6.1:** Incorporate data, inferences, and reasoning to solve problems.

This assignment has two parts. Part 1 has questions about forecasting, covered in unit 5. You will submit your answers to part 1 using the **Unit 6 Assignment template** located in Course Documents. You still need to submit the Excel file you used to generate your answers, in addition to the report in Word. Part 2 covers content from units 1-4 and requires you to analyze a case. For this, you will prepare a PowerPoint presentation to present your findings. See further instructions below under “Part 2-Case Analysis” for more details.

Part 1 – Forecasting

Answer the following three questions using the template provided.

# Question 1

A store managers wishes to forecast the weekly number of television sets sold. Calculate the error for each of the following forecasts, the MAD and the MSE. Be sure to show the entire table in the work area of the template.

# Period Value Forecast Error

1. 202 — —
2. 191 202
3. 173 192
4. 169 181
5. 171 174
6. 175 172
7. 182 174
8. 196 179
9. 204 189
10. 219 198

11 227 211

# Question 2

The data below shows the number of goods manufactured in one year.

($ billion).

Calculate forecasts for years 6 through 13 using a 5-year moving average.

Then, calculate forecasts for years 6 through 13 using a 5-year weighted moving average. Weight the most recent year by 6, the previous year by 4, the year before that by 2, and the other years by 1. Be sure to show the entire table in the work area of the template.

Answer the following questions:

1. What is the forecast for year 13 based on the 5-year moving average?
2. What is the forecast for year 13 based on the 5-year weighted moving average?
3. What is the MAD for the moving average forecast?
4. What is the MAD for the weighted moving average forecast?
5. Which forecasting model that you calculated is better? Why?

|  |  |
| --- | --- |
| Year | Factory orders |
| 1 | 2,512.70 |
| 2 | 2,739.20 |
| 3 | 2,874.90 |
| 4 | 2,934.10 |
| 5 | 2,865.70 |
| 6 | 2,978.50 |
| 7 | 3,092.40 |
| 8 | 3,052.60 |
| 9 | 3,145.20 |
| 10 | 3,114.10 |
| 11 | 3,257.40 |
| 12 | 3,654.00 |
| 13 |  |

# Question 3

The “Economic Report to the President of the United States” included data on the amounts of manufacturers’ new and unfilled orders in millions of dollars. Shown here are the figures for new orders over a 21-year period.

Use the charting tool in Excel to develop a regression model to fit the trend effects for the data. Use a linear model and then try a polynomial (order 2) model. Make sure the charts show the line formula and the r-squared value. Include both charts in your report. Then, answer the following question:

● How well does either model fit the data? Which model should be used for forecasting? Explain using the relevant metrics.

|  |  |
| --- | --- |
| **Year** | **Total Number of New Orders** |
| 1 | 55,022 |
| 2 | 55,921 |
| 3 | 64,182 |
| 4 | 76,003 |
| 5 | 87,327 |
| 6 | 85,139 |
| 7 | 99,513 |
| 8 | 115,109 |
| 9 | 116,251 |
| 10 | 121,547 |
| 11 | 123,321 |
| 12 | 141,200 |
| 13 | 162,140 |
| 14 | 168,420 |
| 15 | 171,250 |
| 16 | 176,355 |
| 17 | 195,204 |
| 18 | 209,389 |
| 19 | 237,025 |
| 20 | 272,544 |
| 21 | 293,475 |

Part 2 – Case Analysis

To answer Part 2, you will prepare a PowerPoint presentation to present your findings. Make sure you also submit the Excel file to show your work for Part 2. **You will receive a 100 point reduction if you fail to include the Excel file showing your work for Part 2.**

Place all calculations for each of the questions on a separate worksheet. Then, using the results of your work from Excel, prepare PowerPoint slides to answer the questions in a presentation format. **All relevant content should be on the slides**; do not use the notes section or leave information in the Excel file. The executives reviewing the presentation should not need to switch to another document to see the required information.

The data you need is provided to you in the **Unit 6 Excel file** in Course Documents. **Make sure to use that file**. Do not type anything in manually or download anything from the Internet.

You will be analyzing the “Colonial Broadcasting” case in the course pack that you bought at the beginning of the course. Begin by reading the description in the case. Then, answer the questions listed below, NOT the questions listed in the case. **Ignore everything in the case document after the end of page 4.**

The executives at CBC want to see how they are doing in ratings against the other networks and how the ratings will continue to change in the upcoming months. They also want to know if hiring stars makes a difference and the impact of fact-based programming compared to hiring stars. Remember that your audience is the management of CBC. Therefore, make sure your presentation is professional and provides sufficient explanation.

1. Answer the following questions:

* 1. What is the average rating for all CBC movies? How about ABN movies and BBS movies?
  2. Include a table that shows the average and the other descriptive statistics (using the data analysis tool pack in Excel) for the ratings of the three networks (one column for each network). Explain what you learn from each of the metrics in the table.
  3. Comment how the networks are performing, using the metrics in the table. Your analysis should extend beyond simply comparing the average ratings for each network.

1. Create a line graph of the monthly average ratings for CBC for the year. Note that there are multiple ratings data for the months; you will need to calculate an average for each month first, and then plot the averages. After you create the graph, fit a linear trend line, displaying the formula and the r-squared. Explain to the executives if you can use this time series data to forecast the ratings of upcoming months. How accurate can you expect this forecast to be?

1. Should the CBC hire stars for their movies? To answer this question, run a hypothesis test to see if there is a significant difference between the ratings of movies with stars versus movies without stars. Use the data for CBC movies only. Use 95% confidence.

Answer the following:

* 1. What are the null and alternative hypotheses (state in full sentences)?
  2. Run the test using Excel and include the output table. Use a t-test assuming equal variances.
  3. What is your recommendation to the executives? Justify your answer referring to the relevant figures.

1. Run a multiple regression where the dependent variable is ratings and the independent variables are star and fact. Use data from CBC only. CBC Management has several questions:
   1. Which dependent variable contributes more when determining a movie’s rating: Being fact-based or having one star? How much does each of these factors change the ratings?
   2. How well does this regression analysis explain the ratings? Justify your answers referring to the relevant figures.
   3. Are either, both, or neither of the independent variables significantly related to the ratings at 95% confidence? Justify your answers referring to the relevant figures.

**Directions for Submitting your Assignment:**

Be sure to complete the Unit 6 Assignment template. Submit your assignment to the **Unit 6 Assignment** Dropbox.

|  |  |  |
| --- | --- | --- |
| **Unit 6 Assignment** |  | |
| **Content** | **Points Possible** | **Points Earned** |
| **Part 1 - Forecasting** |  |  |
| **Question 1**  Provided the MAD. | 5 |  |
| **Question 1**  Provided the MSE. | 5 |  |
| **Question 2a**  Correct forecast for year 13 using a 5-year moving average. | 5 |  |

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| --- | --- | --- |
| **Question 2b**  Correct forecast for year 13 using a 5-year weighted moving average. | 5 |  |
| **Question 2c**  Correct MAD for moving average forecast. | 5 |  |
| **Question 2d**  Correct MAD for weighted moving average forecast. | 5 |  |
| **Question 2e**  Recommended the better model with justification. | 5 |  |
| **Question 3**  Used Excel charting to fit a linear trendline, including the formula and r-squared. | 5 |  |
| **Question 3**  Used Excel charting to fit a polynomial trendline, including the formula and r-squared. | 5 |  |
| **Question 3**  Recommended the better model with justification. | 5 |  |
| **Part 2 – Case Analysis** |  |  |
| **Question 1**  Correct average rating for all three networks. | 10 |  |
| **Question 1**  Correct table showing the average and other descriptive statistics for the ratings of the three networks, using one column for each network. | 10 |  |
| **Question 1**  Appropriate explanation and analysis of what is learned from each of the metrics in the descriptive statistics table. | 20 |  |
| **Question 2**  Correct line graph using the calculated average monthly ratings of CBC for the year, showing r-squared and the formula. | 20 |  |
| **Question 2**  Summary to executives regarding whether the linear forecast can be used to project ratings, including an assessment of how accurate the forecast can be expected to be. | 20 |  |
| **Question 3**  Correct null and alternative hypotheses stated in full sentences. | 20 |  |
| **Question 3**  Accurate hypothesis test results. | 20 |  |
| **Question 3**  Correct recommendation and justification for whether CBC should hire stars. | 20 |  |
| **Question 4**  Correct figures and explanation of how much contribution each independent variable makes when determining a movie’s rating: | 20 |  |
| **Question 4**  Correct figures and explanation of how well this regression analysis explains the ratings. | 20 |  |
| **Question 4**  Correct figures, accurate identification and justification of which variables are significantly related to ratings. | 20 |  |
| PowerPoint is formatted appropriately and communicated clearly. | 50 |  |
| **Total** | **300** |  |