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. You will submit your answers using the **Unit 6 Assignment template** located in Course Documents for Part 1.

Part 2 requires you to analyze a case. For this, you will prepare a PowerPoint presentation to present your findings. See below under “Part 2-Case Analysis” for more details.

Part 1 – Forecasting

Answer the following three questions using the template provided.

Question 1

A marketing manager is forecasting the sales of cars per week. Determine the error for each of the following forecasts. Then, calculate MAD and MSE.

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 U.S. Census Bureau publishes data on factory orders for all manufacturing, durable goods, and nondurable goods industries. Shown below are factory orders in the United States over a 13year period ($ billion).

First, use the data to develop forecasts for years 6 through 13 using a 5-year moving average.

Then, use the data to develop 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.

Answer the following questions:

a) What is the forecast for year 13 based on the 5-year moving average?
b) What is the forecast for year 13 based on the 5-year weighted moving average?
c) What is the MAD for the moving average forecast?
d) What is the MAD for the weighted moving average forecast?
e) Which forecasting model is better?

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 coursepack. 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 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:

    a. What is the average rating for all CBC movies? How about ABN movies and BBS movies?
    b. 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.
    c. Comment on which network is doing best.

2. 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?

3. 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:

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

4. 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:
   a. Which has more impact on a movie's rating: Being fact-based or having one star? How much does each of these factors change the ratings?
   b. How well does this regression analysis explain the ratings? Justify your answers referring to the relevant figures.
   c. 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	

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 Appropriate explanation on what has more impact on a movie's rating: Whether the movie includes a star or whether it is fact- based.	20	

Question 4 Explanation of how well this regression analysis explains the ratings.	20	
Question 4 Accurate identification and justification of which variables are significantly related to ratings.	20	
PowerPoint is formatted appropriately and communicated clearly.	50	
Total	**300**	