

Question 1

Part 1) The following are the monthly number of visits to a website for part of 2015.

Month	Visits					
January	10000					
February	10230					
March	10332					
April	10455					
May	10678					
June	10982					

A) Use exponential smoothing with a smoothing constant 0.2. Calculate the MSE, MAE and MAPE



Part 2)

The ecommerce website also wanted to explore the 2011, 2012, 2013, and 2014 quarterly visits to their website to see if they can use this as a method to forecast future website visits. The below output provides Quarter 1 = 1 if it is Quarter 1, 0 otherwise; Quarter 2 = 1 if it is Quarter 2, 0 otherwise; Quarter 3 = 1 if it is Quarter 3, 0 otherwise. The following Excel output was produced based on this data.

<i>Regression Statistics</i>	
Multiple R	0.771375
R Square	0.59501
Adjusted R Square	0.44774
Standard Error	469.2827
Observations	16

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	3559145.2	889786.3	4.0402384	0.029622
Residual	11	2422488.55	220226.2		
Total	15	5981633.75			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	11442.875	351.962	32.5116	2.78E-12
Quarter 1	148.1375	341.0381	0.434372	0.672415
Quarter 2	285.425	335.9533	0.849592	0.4136606
Quarter 3	-527.7875	332.8683	1.58557	0.141144
Periods	85.2125	26.2337	3.248207	0.00776

B) Forecast the results for the 4 quarters of 2016.

Quarter 1:

Quarter 2:

Quarter 3:

Quarter 4:

Question 1

The following data is provided to answer the below questions.

Month	Visits					
January	12					
February	14					
March	15					
April	11					
May	14					
June	15					

A) Using a 3-period moving average, calculate the MAPE

B) Use exponential smoothing with a smoothing constant of 0.3, calculate the MAPE

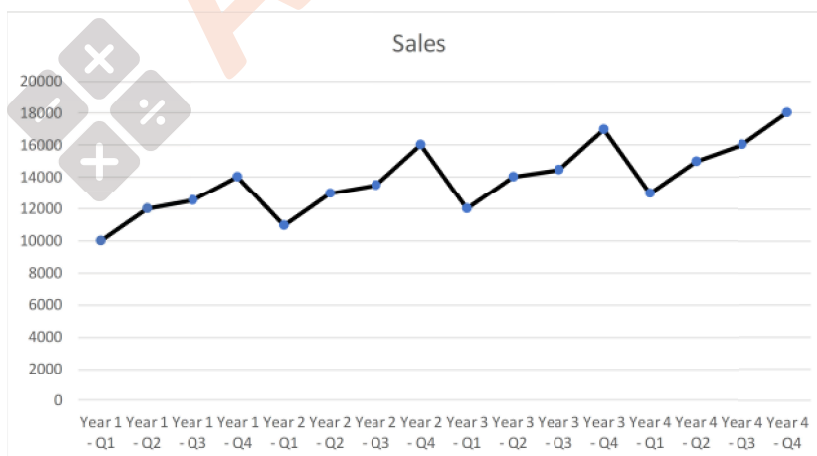


Question # 1

C) Which forecasting technique is better?

D) Using the forecasting technique you selected in part C), provide a forecast for July

E) This part of the question is answered independently of questions a) through d). Given the following graph, which is the appropriate forecasting technique(s) that can be used for this type of pattern?



Question 1

Based on the following data, please answer the series of questions provided.

Period	Sales			
1	120			
2	159			
3	111			
4	139			
5	154			
6	189			

A) Using a 3-period moving average, calculate the MAE (MAD). Use weights of 0.1, 0.4 and 0.5 placing the highest weight on the most recent periods

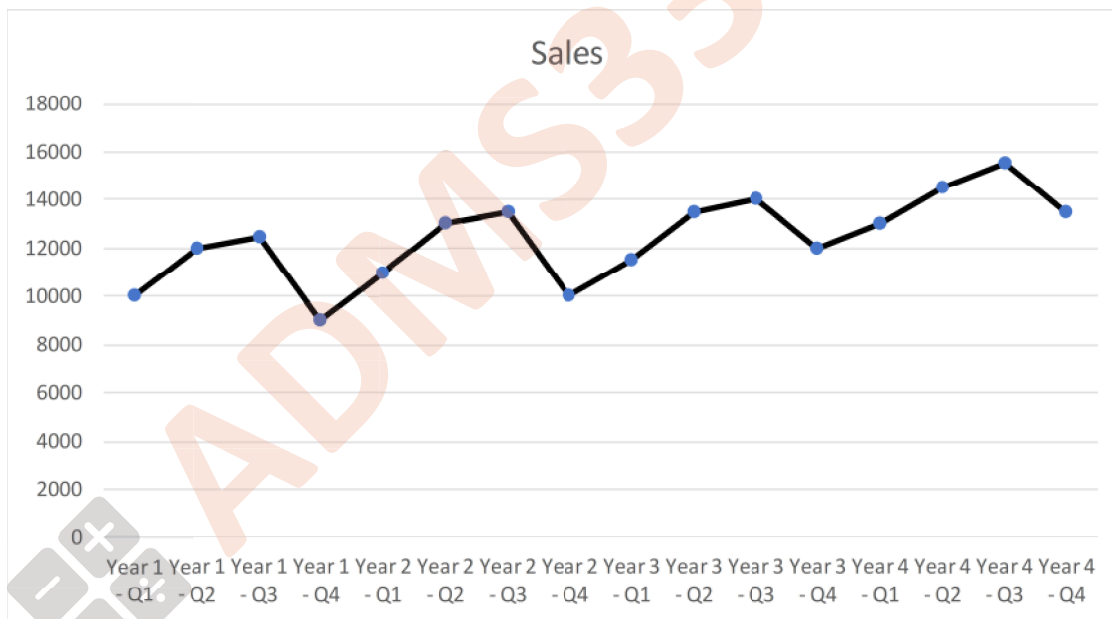
B) Use exponential smoothing with a smoothing constant of 0.4, calculate the MAE (MAD)

C) Which forecasting method is better.



D) Using the forecasting technique, you selected in part c), provide a forecast for the 7th period.

E) This part of the question is answered independently of questions a) through d). Given the following graph, which is the appropriate forecasting technique(s) that can be used for this type of pattern?



Question 2

The Grand Bahama Motorcycle Company wants to forecast the demand for motorcycles so that the proper number of motorcycles can be ordered from the distributor. The company has gathered the following data for the past seven weeks from its sales records.

Week	Motorcycle Sales				
1	72				
2	39				
3	60				
4	36				
5	57				
6	69				
7	45				

- A) Develop 3-week moving average forecast values for this time series. Compute MAPE and forecast motorcycle sales for Week 8. Show your calculation in the above table.



B) Using the table below, compute the exponential smoothing forecast values for the time series with a smoothing constant $\alpha = 0.40$. Compute MAPE and forecast motorcycle sales for Week 8. Show your calculations in the table below.

Week	Motorcycle Sales				
1	72				
2	39				
3	60				
4	36				
5	57				
6	69				
7	45				

C) Applying the MAPE as the measures of forecast accuracy, do you prefer the 3-week moving average forecast or the exponential smoothing forecast.

Question 1

PART I

You have gathered your sales data for a specific product in your store over the last 5 months of 2017 (January to May). The sales data are as follows:

Month	Sales	ES Forecast				
January	315					
February	310					
March	345					
April	375					
May	365					

A) Use exponential smoothing with a smoothing constant of 0.6. Calculate the MSE, MAE, and MAPE.



B) Another analyst suggested that you use a weighted moving average technique using weights of 0.6 and 0.4. Calculate the MAE for this method. The above table is reproduced below.

Month	Sales	ES Forecast				
January	315					
February	310					
March	345					
April	375					
May	365					

Use the appropriate forecasting method based on your MAE calculation for the exponential smoothing method in part a), and the MAE you just calculated above for the weighted moving average, to forecast the sales of JUNE 2017.



Question 1

PART II

You believe that your sales are seasonal and that the data has a trend. After exploring your 2013, 2014, 2015, and 2016 seasonal sales data you have on record, the following Excel output was produced based on this data:

<i>Regression Statistics</i>				
Multiple R		0.99		
R Square		0.979		
Adjusted R		0.974		
Standard E		106.12		
Observatio		12		

ANOVA				
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	3	5918193	1972731	127.39
Residual	8	123887.6	15485.95	
Total	11	6042081		

	<i>Coefficients</i>	<i>andard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	1994.19	79.59	25.05	0
S1	-134.26	77.12	-1.74	0.11
S2	1311.92	75.28	17.43	0
Periods	63.08	5.93	10.63	0

C) Forecast the sales for the following seasons of the given years.

Season 3, 2017

Season 1, 2018



Question 1

A logistic company has been monitoring fuel for a humanitarian fleet to predict shortage in a country. The following data show the number of gallons of gasoline sold by a gasoline distributor in a city of the country.

PART 1

A) Using a two-period moving average method, determine the forecasts of demand for weeks 3 through 12, and enter the figures in the forecast column (do NOT round off any of the calculated figures).

Week	Gallons of Gasoline	2-period MVA	Error	Square of Error	Absolute Error	Absolute Percentage Error
1	114					
2	127					
3	129					
4	118					
5	110					
6	139					
7	102					
8	109					
9	131					
10	117					
11	143					
12	120					
				MSE	MAE	MAPE

B) Using the other blank columns in the above table, calculate for weeks 3 through 12 the forecast errors and other relevant figures you may require to determine the MSE (mean squared error), the MAE (mean absolute error) and the MAPE (mean absolute percentage) in weeks 3-12. In the space below, show your final computations of MSE, MAE, and MAPE.

C) The logistics company applies exponential smoothing with $\alpha = 0.2$. Then, the results of MSE = 198.1154, MAE=11.8390 and MAPE=9.5165. Which forecasting technique provides a more accurate result, 2-period moving average or the exponential smoothing with $\alpha = 0.2$?

D) Using the forecasting technique that you answered in question (3) of part 1, calculate the forecasting amount of the 13th week.



Question 1

PART 2

Graph (a) represents monthly sales amount (in \$1,000) from January to December. The x-axis represents the months and the y-axis represents the sales amount. What kind(s) of forecasting techniques(s) should be applied if a sales manager finds the data pattern like graph (A) ? Provide the name(s) of the technique(s) covered in class that can be appropriately used for this type of data pattern.

