

# [Week 1 assignment](https://assignbuster.com/week-1-assignment/)

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The following gives the number of pints of type A blood used at Woodlawn Hospital in the past 6 weeks: Week Of Pints Used August 31 360 September 7389   
September 14   
410   
September 21   
381   
September 28   
368   
October 5   
374   
a) Forecast the demand for the week of October 12 using a 3-week moving average.   
[381+368+374]/3 = 374. 33 pints   
b) Use a 3-week weighted moving average, with weights of . 1, . 3, and . 6, using . 6 for the most recent week. Forecast demand for the week of October 12.   
381\*0. 1   
38. 1   
368\*0. 3   
110. 4   
374\*0. 6   
224. 4   
Forecast (October 12).   
372. 9   
c) Compute the forecast for the week of October 12 using exponential smoothing with a forecast for August 31 of 360 andα = . 2.   
Week Of   
Pints Used   
Forecast   
Forecasting error   
Error\*0. 20   
Forecast   
August 31   
360   
360   
0   
0   
360   
September 7   
389   
360   
29   
5. 8   
365. 8   
September 14   
410   
365. 8   
44. 2   
8. 84   
374. 64   
September 21   
381   
374. 64   
6. 36   
1. 272   
375. 912   
September 28   
368   
375. 912   
-7. 912   
-1. 5824   
374. 3296   
October 5   
374   
374. 32296   
-0. 3296   
-0. 06592   
374. 2636   
The Carbondale Hospital is considering the purchase of a new ambulance. The decision will rest partly on the anticipated mileage to be driven next year. The miles driven during the past 5 years are as follows:   
Year   
Mileage   
1   
3, 000   
2   
4, 000   
3   
3, 400   
4   
3, 800   
5   
3, 700   
\*Note: means the problem may be solved with POM for Windows and/or Excel OM.   
a. Forecast the mileage for next year using a 2-year moving average.   
[3, 700+3, 800]/2 = 3, 750 ml.   
b. Find the MAD based on the 2-year moving average forecast in part (a).(Hint: You will have only 3 years of matched data.)   
Year   
Mileage   
Two-year Moving Average   
Error   
/error/   
1   
3, 000   
2   
4, 000   
3   
3, 400   
3, 500   
-100   
100   
4   
3, 800   
3, 700   
100   
100   
5   
3, 700   
3, 600   
100   
100   
Totals   
100   
100   
Mfile:///D:/Downloads/878980\_t2\_202013\_20econ11026\_20\_20assessment\_20question\_20. pdfAD = 300/3 = 100   
c. Use a weighted 2-year moving average with weights of . 4 and . 6 to forecast next year’s mileage. (The weight of . 6 is for the most recent year.) What MAD results from using this approach to forecasting? (Hint: You will have only 3 years of matched data.)   
Year   
Mileage   
Forecast   
Error   
/error/   
1   
3, 000   
2   
4, 000   
3   
3, 400   
3, 600   
-200   
200   
4   
3, 800   
3, 640   
160   
160   
5   
3, 700   
3, 640   
60   
60   
420   
Forecasting for year 6 = 3, 740   
MAD = 140[420/3]   
d. Compute the forecast for year 6 using exponential smoothing, an initial forecast for year 1 of 3, 000 miles, and α = . 5.   
Year   
Mileage   
Forecast   
Forecast Error   
Error\*0. 50   
New Forecast   
1   
3, 000   
3, 000   
0   
0   
3, 000   
2   
4, 000   
3, 000   
1, 000   
500   
3, 500   
3   
3, 400   
3, 600   
-100   
-50   
3, 450   
4   
3, 800   
3, 640   
350   
175   
3, 625   
5   
3, 700   
3, 640   
75   
38   
3, 663   
Total   
1, 325   
Therefore, forecast = 3, 663 miles.   
4. 9   
Dell uses the CR5 chip in some of its laptop computers. The prices for the chip during the past 12 months were as follows:   
Month   
Price per Chip   
Month   
Price per Chip   
January   
$1. 80   
July   
1. 80   
February   
1. 67   
August   
1. 83   
March   
1. 70   
September   
1. 70   
April   
1. 85   
October   
1. 65   
May   
1. 90   
November   
1. 70   
June   
1. 87   
December   
1. 75   
a) Use a 2-month moving average on all the data and plot the averages and the prices.   
Month   
Price per Chip ($)   
2-month moving average   
January   
1. 8   
  
February   
1. 67   
  
March   
1. 7   
1. 735   
April   
1. 85   
1. 685   
May   
1. 9   
1. 775   
June   
1. 87   
1. 875   
July   
1. 8   
1. 885   
August   
1. 83   
1. 835   
September   
1. 7   
1. 815   
October   
1. 65   
1. 765   
November   
1. 7   
1. 675   
December   
1. 75   
1. 675   
b) Use a 3-month moving average and add the 3-month plot to the graph created in part (a).   
Month   
Price per Chip ($)   
3-month moving average   
January   
1. 8   
  
February   
1. 67   
  
March   
1. 7   
  
April   
1. 85   
1. 72   
May   
1. 9   
1. 74   
June   
1. 87   
1. 82   
July   
1. 8   
1. 87   
August   
1. 83   
1. 86   
September   
1. 7   
1. 83   
October   
1. 65   
1. 78   
November   
1. 7   
1. 73   
December   
1. 75   
1. 68   
December + 1 Month   
  
1. 70   
c) Which is better (using the mean absolute deviation): the 2-month average or the 3-month average?   
Month   
Price per Chip ($)   
2-month moving average   
Error   
Absolute   
January   
1. 8   
  
  
  
February   
1. 67   
  
  
  
March   
1. 7   
1. 735   
-0. 035   
0. 03   
April   
1. 85   
1. 685   
0. 165   
0. 17   
May   
1. 9   
1. 775   
0. 125   
0. 13   
June   
1. 87   
1. 875   
-0. 005   
0. 00   
July   
1. 8   
1. 885   
-0. 085   
0. 09   
August   
1. 83   
1. 835   
-0. 005   
0. 00   
September   
1. 7   
1. 815   
-0. 115   
0. 12   
October   
1. 65   
1. 765   
-0. 115   
0. 12   
November   
1. 7   
1. 675   
0. 025   
0. 03   
December   
1. 75   
1. 675   
0. 075   
0. 08   
MAD   
0. 08   
Month   
Price per Chip ($)   
3-month moving average   
Error   
Absolute   
January   
1. 8   
  
  
  
February   
1. 67   
  
  
  
March   
1. 7   
  
  
  
April   
1. 85   
1. 72   
0. 13   
0. 13   
May   
1. 9   
1. 74   
0. 16   
0. 16   
June   
1. 87   
1. 82   
0. 05   
0. 05   
July   
1. 8   
1. 87   
-0. 07   
0. 07   
August   
1. 83   
1. 86   
-0. 03   
0. 03   
September   
1. 7   
1. 83   
-0. 13   
0. 13   
October   
1. 65   
1. 78   
-0. 13   
0. 13   
November   
1. 7   
1. 73   
-0. 03   
0. 03   
December   
1. 75   
1. 68   
0. 07   
0. 07   
MAD   
0. 09   
The 2-month average is better because it has a lower MAD, hence more accurate.   
d) Compute the forecasts for each month using exponential smoothing, with an initial forecast for January of $1. 80. Use α = . 1, then α = . 3, and finally α = . 5. Using MAD, which α is the best?   
Month   
Price per Chip ($)   
Forecast using exponential smoothing ( alpha = 0. 1)   
Error   
Absolute   
January   
1. 8   
1. 8   
0. 00   
0. 000   
February   
1. 67   
1. 8   
-0. 13   
0. 130   
March   
1. 7   
1. 79   
-0. 09   
0. 087   
April   
1. 85   
1. 78   
0. 07   
0. 072   
May   
1. 9   
1. 79   
0. 11   
0. 115   
June   
1. 87   
1. 80   
0. 07   
0. 073   
July   
1. 8   
1. 80   
0. 00   
0. 004   
August   
1. 83   
1. 80   
0. 03   
0. 026   
September   
1. 7   
1. 81   
-0. 11   
0. 106   
October   
1. 65   
1. 80   
-0. 15   
0. 146   
November   
1. 7   
1. 78   
-0. 08   
0. 081   
December   
1. 75   
1. 77   
-0. 02   
0. 023   
MAD   
0. 072   
Month   
Price per Chip ($)   
Forecast using exponential smoothing ( alpha = 0. 3)   
Error   
Absolute   
January   
1. 8   
1. 8   
0. 00   
0. 000   
February   
1. 67   
1. 8   
-0. 13   
0. 130   
March   
1. 7   
1. 76   
-0. 06   
0. 061   
April   
1. 85   
1. 74   
0. 11   
0. 107   
May   
1. 9   
1. 77   
0. 13   
0. 125   
June   
1. 87   
1. 81   
0. 06   
0. 058   
July   
1. 8   
1. 83   
-0. 03   
0. 030   
August   
1. 83   
1. 82   
0. 01   
0. 009   
September   
1. 7   
1. 82   
-0. 12   
0. 124   
October   
1. 65   
1. 79   
-0. 14   
0. 136   
November   
1. 7   
1. 75   
-0. 05   
0. 046   
December   
1. 75   
1. 73   
0. 02   
0. 018   
  
  
  
MAD   
0. 070   
Month   
Price per Chip ($)   
Forecast using exponential smoothing ( alpha = 0. 5)   
Error   
Absolute   
January   
1. 8   
1. 8   
0. 00   
0. 000   
February   
1. 67   
1. 8   
-0. 13   
0. 130   
March   
1. 7   
1. 74   
-0. 03   
0. 035   
April   
1. 85   
1. 72   
0. 13   
0. 133   
May   
1. 9   
1. 78   
0. 12   
0. 116   
June   
1. 87   
1. 84   
0. 03   
0. 028   
July   
1. 8   
1. 86   
-0. 06   
0. 056   
August   
1. 83   
1. 83   
0. 00   
0. 002   
September   
1. 7   
1. 83   
-0. 13   
0. 129   
October   
1. 65   
1. 76   
-0. 11   
0. 114   
November   
1. 7   
1. 71   
-0. 01   
0. 007   
December   
1. 75   
1. 70   
0. 05   
0. 046   
MAD   
0. 066   
The Forecast using exponential smoothing using alpha = 0. 5 is better because it has the lowest MAD (Abraham & Leddolter, 2005).   
4. 11   
a) Use exponential smoothing with a smoothing constant of 0. 3 to forecast the registrations at the seminar given in Problem 4. 10. To begin the procedure, assume that the forecast for year 1 was 5, 000 people signing up. (Abraham & Leddolter, 2005).   
Year   
Registrations (000)   
Forecast registrations (‘ 000) using exponential smoothing ( alpha = 0. 3)   
1   
4   
5   
2   
6   
4. 7   
3   
4   
5. 09   
4   
5   
4. 76   
5   
10   
4. 83   
6   
8   
6. 38   
7   
7   
6. 87   
8   
9   
6. 91   
9   
12   
7. 54   
10   
14   
8. 87   
11   
15   
10. 41   
b) What is the MAD?   
Year   
Registrations (000)   
Forecast registrations (‘ 000) using exponential smoothing ( alpha = 0. 3)   
Error   
Absolute   
1   
4   
5   
-1. 00   
1. 00   
2   
6   
4. 7   
1. 30   
1. 30   
3   
4   
5. 09   
-1. 09   
1. 09   
4   
5   
4. 76   
0. 24   
0. 24   
5   
10   
4. 83   
5. 17   
5. 17   
6   
8   
6. 38   
1. 62   
1. 62   
7   
7   
6. 87   
0. 13   
0. 13   
8   
9   
6. 91   
2. 09   
2. 09   
9   
12   
7. 54   
4. 46   
4. 46   
10   
14   
8. 87   
5. 13   
5. 13   
11   
15   
10. 41   
4. 59   
4. 59   
MAD   
2. 44   
Reference   
Abraham, B., & Leddolter, J. (2005). Statistical Methods for Forecasting. New York: Wiley.