

→ Time Series Analysis:-

D) Considers sales data of an organization for 10 years. use 3-years moving average to predict the sales for the year 2019.

Year	Sales
2009	213
2010	221
2011	198
2012	234
2013	201
2014	197
2015	212
2016	222
2017	217
2018	219
2019	?

compute the errors in prediction.  
compute MAD, RMSE and MAPE

A)

years	Sales	Forecast as per 3 years MA (Y-cap)	Errors (Y - Y-cap)	Absolute Errors	Squared Errors	% Errors
2009	213					
2010	221					
2011	198	<del>210.67</del>	23.33	23.33	544.2889	$\frac{23.33}{234} \times 100 = 9.9701$
2012	234	210.67	16.67	16.67	277.8889	8.2935
2013	201	217.67	-14	14	196	7.1066
2014	197	211	1.33	1.33	1.7689	0.6274
2015	212	210.67	18.67	18.67	348.5689	8.4099
2016	222	203.33	6.67	6.67	44.4889	3.0737
2017	217	210.33	2	2	4	0.9132
2018	219	217				
2019		219.33				
			Bias = 21.33	MAD = 11.81	RMSE = 14.2278	MAPE = 5.4849

$$\text{Tracking Signal} = \frac{\text{Bias}}{\text{MAD}} = 1.8061$$

Note:- Tracking Previous signal > 6 or < -6, prediction no longer valid. based on

2) Vacuum cleaner sales for 12 months are given here.

month	Actual sales (in units)
1	10
2	12
3	13
4	16
5	19
6	23
7	26
8	30
9	28
10	18
11	16
12	14

The owner of Supermarket decides to forecast sales by weighting the past 3 months as follows

weights Applied	month
3	Previous month
2	Two months back
1	Three months back

Compute weighted moving average and predict the sales for 13<sup>th</sup> month.

A)

month	Actual sales (in units)	3-months weighted average forecast
1	10	
2	12	
3	13	
4	16	$(13 \times 3 + 12 \times 2 + 10 \times 1) / 6 = 12.1667$
5	19	14.3333
6	23	17
7	26	20.5
8	30	23.8333
9	28	27.5
10	18	28.3333
11	16	23.3333
12	14	18.6667
13		15.3333 ✓

forecast of 3 months to forecast  
 2 months 3 months 3 months 3 months  
 1 month 2 months 3 months 4 months  
 5 months 6 months 7 months 8 months  
 9 months 10 months 11 months 12 months  
 13 months 14 months 15 months 16 months  
 17 months 18 months 19 months 20 months  
 21 months 22 months 23 months 24 months  
 25 months 26 months 27 months 28 months  
 29 months 30 months 31 months 32 months  
 33 months 34 months 35 months 36 months  
 37 months 38 months 39 months 40 months  
 41 months 42 months 43 months 44 months  
 45 months 46 months 47 months 48 months  
 49 months 50 months 51 months 52 months  
 53 months 54 months 55 months 56 months  
 57 months 58 months 59 months 60 months  
 61 months 62 months 63 months 64 months  
 65 months 66 months 67 months 68 months  
 69 months 70 months 71 months 72 months  
 73 months 74 months 75 months 76 months  
 77 months 78 months 79 months 80 months  
 81 months 82 months 83 months 84 months  
 85 months 86 months 87 months 88 months  
 89 months 90 months 91 months 92 months  
 93 months 94 months 95 months 96 months  
 97 months 98 months 99 months 100 months