

## 1.3.8: End of Chapter Problems

### End of Chapter Problems

#### Problem #1

Below are monthly sales of light bulbs from the lighting store.

Month	Sales
Jan	255
Feb	298
Mar	357
Apr	319
May	360
June	

Forecast sales for June using the following

1. Naïve method
2. Three- month simple moving average
3. Three-month weighted moving average using weights of .5, .3 and .2
4. Exponential smoothing using an alpha of .2 and a May forecast of 350.

#### Solution

1. 360
2.  $(357 + 319 + 360) / 3 = 345.3$
3.  $360 \times .5 + 319 \times .3 + 357 \times .2 = 347.1$
4.  $350 + .2(360 - 350) = 352$

#### Problem #2

Demand for aqua fit classes at a large Community Center are as follows for the first six weeks of this year.

Week	Demand
1	162
2	158
3	138
4	190
5	182
6	177
7	

You have been asked to experiment with several forecasting methods. Calculate the following values:

- a) Forecast for weeks 3 through week 7 using a two-period simple moving average
- b) Forecast for weeks 4 through week 7 using a three-period weighted moving average with weights of .6, .3 and .1
- c) Forecast for weeks 4 through week 7 using exponential smoothing. Begin with a week 3 forecast of 130 and use an alpha of .3

### Solution

Week	Demand	a)	b)	c)
1	162			
2	158			
3	138	$(162 + 158) / 2 = \mathbf{160}$		<b>130</b>
4	190	$(158 + 138) / 2 = \mathbf{148}$	$138 \times .6 + 158 \times .3 + 162 \times .1 = \mathbf{146.4}$	$130 + .3 \times (138 - 130) = \mathbf{132.4}$
5	182	$(138 + 190) / 2 = \mathbf{164}$	$190 \times .6 + 138 \times .3 + 158 \times .1 = \mathbf{171.2}$	$132.4 + .3 \times (190 - 132.4) = \mathbf{149.7}$
6	177	$(190 + 182) / 2 = \mathbf{186}$	$182 \times .6 + 190 \times .3 + 138 \times .1 = \mathbf{180}$	$149.7 + .3 \times (182 - 149.7) = \mathbf{159.4}$
7		$(182 + 177) / 2 = \mathbf{179.5}$	$177 \times .6 + 182 \times .3 + 190 \times .1 = \mathbf{179.8}$	$159.4 + .3 \times (177 - 159.4) = \mathbf{164.7}$

### Problem #3

Sales of a new shed has grown steadily from the large farm supply store. Below are the sales from the past five years. Forecast the sales for 2018 and 2019 using exponential smoothing with an alpha of .4. In 2015, the forecast was 360. Calculate a forecast for 2016 through to 2020.

Year	Sales	Forecast
2015	348	360
2016	372	
2017	311	
2018	371	
2019	365	
2020		

### Solution

Year	Sales	Forecast
2015	348	<b>360</b>
2016	372	$360 + .4 \times (348 - 360) = \mathbf{355.2}$
2017	311	$355.2 + .4 \times (372 - 355.2) = \mathbf{361.9}$
2018	371	$361.9 + .4 \times (311 - 361.9) = \mathbf{341.6}$
2019	365	$341.6 + .4 \times (371 - 341.6) = \mathbf{353.3}$
2020		$353.3 + .4 \times (365 - 353.3) = \mathbf{358.0}$

### Problem #4

Below is the actual demand for X-rays at a medical clinic. Two methods of forecasting were used. Calculate a mean absolute deviation for each forecast method. Which one is more accurate?

Week	Actual Demand	Forecast #1	Forecast #2
1	48	50	50
2	65	55	56
3	58	60	55
4	79	70	85

### Solution

Week	Actual Demand	Forecast #1	ErrorI	Forecast #2	ErrorI
1	48	50	2	50	2
2	65	55	10	56	9
3	58	60	2	55	3
4	79	70	9	85	6
		<b>Mean Deviation:</b>	<b>Abs</b> 5.75	<b>Mean Deviation:</b>	<b>Abs</b> 5

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