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Exam #6

1)

Year	HPI	3 year Moving Avg. Forecast	Error	|Ei|	E^2
1	143.51	—	—	—	
2	149.14	—	—	—	
3	152.34	—	—	—	
4	158.59	148.33	10.26	10.26	105.27
5	164.02	153.36	10.66	10.66	113.64
6	169.47	158.32	11.15	11.15	124.32
7	165.67	164.02	1.65	1.65	2.72
8	162.67	166.39	-3.72	3.72	13.84
9	158.29	165.94	-7.65	7.65	58.52
10	160.06	162.21	-2.15	2.15	4.62
11	156.15	160.34	-4.19	4.19	17.56
12	152.93	158.17	-5.24	5.24	27.46
				56.67	467.9453

2) Weighting scheme = last month weighted by 3, previous by 2, month before that by 1

Year	3 year weighted Moving Avg. Forecast	Error	|Ei|	E^2
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	149.80	8.79	8.79	77.26
5	154.93	9.09	9.09	82.63
6	160.26	9.21	9.21	84.82
7	165.84	-.17	.17	.0289
8	166.66	-3.99	3.99	15.92
9	164.80	-6.51	6.51	42.38
10	160.98	-.92	.92	.8464
11	159.91	-3.76	3.76	14.14
12	157.81	-4.88	4.88	23.81
			47.32	341.8938

3) $SS_{xy} = 12406.5 - \frac{(78)(1892.46)}{12} = 105.51$

$SS_{xx} = 650 - \frac{(78)^2}{12} = 143$

$b_1 = \frac{SS_{xy}}{SS_{xx}} = \frac{105.51}{143} = .738$

$b_0 = \frac{1892.46}{12} - .738\left(\frac{78}{12}\right) = 157.705 - 4.797 = 152.91$

$\hat{y} = 152.91 + .738x$

Year	Linear Regression Forecast	Error	$\lvert E_i \rvert$	E_i^2
1	153.65	-10.14	10.14	102.82
2	154.39	-5.25	5.25	27.56
3	155.12	-2.78	2.78	7.73
4	155.86	2.73	2.73	7.45
5	156.60	7.42	7.42	55.06
6	157.34	12.13	12.13	147.14
7	158.08	7.2	7.2	51.84
8	158.81	3.86	3.86	14.9
9	159.55	-1.26	1.26	1.59
10	160.29	-.23	.23	.05
11	161.03	-4.88	4.88	23.81
12	161.77	-8.84	8.84	78.15
			66.72	518.0968

4) 3-year moving Averages

$MAD = \frac{\Sigma |e_i|}{\#\text{of F}}$

$= \frac{56.67}{9} = 6.297$

$MSE = \frac{\Sigma e_i^2}{\#\text{of Forecasts}}$

$= \frac{467.9453}{9} = 51.994$

3year-Weighted Moving Averages

$MAD = \frac{47.32}{9} = 5.258$

$MSE = \frac{341.8438}{9} = 37.983$

Linear Regression Analysis

$MAD = \frac{66.72}{12} = 5.56$

$MSE = \frac{518.0968}{12} = 43.175$

5) My forecast for year 13 is 155.19 (HPI). I arrived at this answer by using the weighted moving average forecast. I used this forecast because it had the lowest MAD and MSE values, suggesting that it is the most accurate forecasting method out of the methods used, given the current data set.

$$\frac{3(152.93) + 2(156.15) + (160.06)}{6} = 155.19$$