#2 (Total 45 Points)

(1)

t	y_t	$\hat{y}_t$	$e_t = y_t - \hat{y}_t$	e_t^2
1	933	**788,95**	144,05	20751,71
2	826	838,49	-12,49	156,02
3	748	888,04	-140,04	19610,18
4	908	937,58	-29,58	875,08
5	983	987,13	-4,13	17,03
6	1009	1036,67	-27,67	765,78
7	1101	1086,22	14,78	218,50
8	1149	1135,76	13,24	175,20
9	1207	1185,31	21,69	470,50
10	1255	1234,85	20,15	405,84

$$\hat{y}_1 = 739{,}40 + 49{,}55 * 1 = \mathbf{788{,}95}$$

(2)

$$e_t^z = \frac{e_t}{\sqrt{\frac{1}{n-1} * \sum_{t=1}^{n} e_t^2}}$$

$$\sqrt{\frac{1}{n-1} * \sum_{t=1}^{n} e_t^2} = \sqrt{\frac{1}{10-1} * 43445{,}85} = 69{,}48$$

t	e_t^z	t	e_t^z
1	144,05/69,48 = 2,07	6	-0,40
2	-0,18	7	0,21
3	-2,02	8	0,19
4	-0,43	9	0,31
5	-0,06	10	0,29

(3)

$$d = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2}$$

t	$(\boldsymbol{e_t - e_{t-1}})^2$
1	
2	$(-12{,}49 - 144{,}05)^2 = 24506{,}48$
3	16267,84
4	12200,21
5	647,93
6	554,39
7	1802,39
8	2,39
9	71,48
10	2,39
Σ	**56055,50**

$$d = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2} = \frac{56055{,}50}{43445{,}85} = 1{,}29$$

<u>Durbin-Watson Test: positive autocorrelation</u>

H_0: The error terms are ***not positively autocorrelated***

versus the alternative hypothesis

H_1: The error terms are ***positively autocorrelated***

$$d_{L,\alpha} \leq d \leq d_{U,\alpha} \Leftrightarrow 0{,}879 \leq 1{,}29 \leq 1{,}320$$

The test is inconclusive.

<u>Durbin-Watson Test: negative autocorrelation</u>

H_0: The error terms are ***not negatively autocorrelated***

versus the alternative hypothesis

H_a: The error terms are ***negatively autocorrelated***

$$(4 - d) = (4 - 1{,}29) = 2{,}71$$

$$(4 - d) > d_{U,\alpha} \Leftrightarrow 2{,}71 > 1{,}32$$

We do not reject H_0.