Durbin-Watson Test

H_0: There is no auto correlation

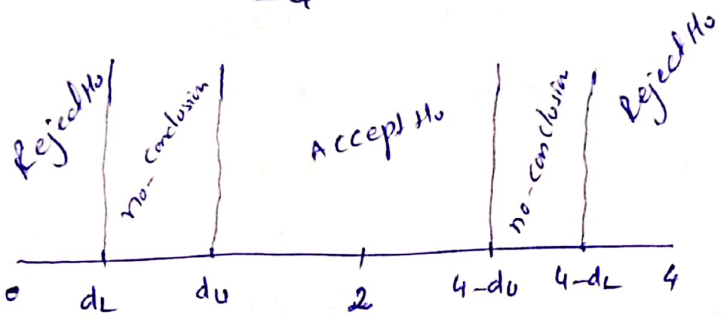
H_1: There is autocorrelation

$\alpha = 0.05$

Test-statistic

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

C.R



Conclusion

Q. On an experiment to measure the stiffness of a spring the length of the spring under different loads was measured. The regression equations appropriate for predicting the length on the basis of weight is

$$\hat{y} = 8.74 + 1.02X$$

($\hat{y}$: length; X: weight)

The residual and the observed data are as follow

X	Y	e
3	10	-1.3494
5	12	-1.8796
6	15	0.1053
9	18	0.0602
10	20	1.0451
12	22	1.0151
15	27	2.9699
20	30	0.3946
22	32	0.8645
28	34	-3.2257

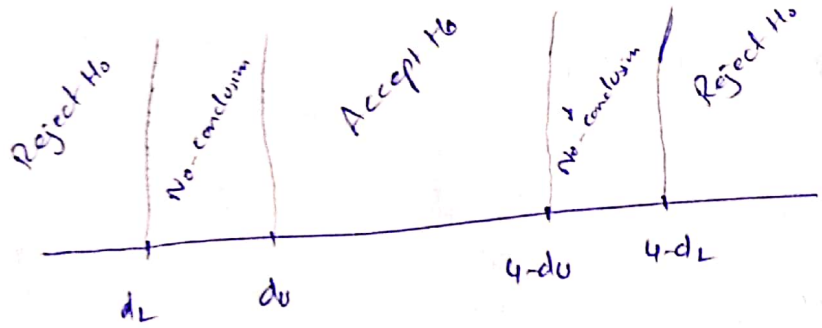
Test the auto correlation using Durbin-watson Test at 5% level of significance.

Sol.

Calculation for d

e_t	e_{t-1}	$(e_t - e_{t-1})^2$	e_t^2
-1.8494	—	—	3.4202
-1.8796	-1.8494	0.00091	3.5328
0.1053	-1.8796	3.9398	0.0111
0.0602	0.1053	0.0020	0.0036
1.0451	0.0602	0.9700	1.0922
1.0151	1.0451	0.009	1.0304
2.9699	1.0151	3.8212	8.8203
0.8946	2.9699	4.3069	0.8003
0.8645	0.8946	0.0009	0.7473
-3.2257	0.8645	16.7297	10.4051
		29.7804	29.8633

$$d = \frac{\sum (e_t - e_{t-1})^2}{\sum e_t^2} = \frac{29.7804}{29.8633} \Rightarrow 0.9972$$



$d_L =$

$d_U =$