Practical 13

Observation	RR	Growth	Inflation
1954	53.0	6.7	−0.4
1955	31.2	2.1	0.4
1956	3.7	1.8	2.9
1957	−13.8	−0.4	3.0
1958	41.7	6.0	1.7
1959	10.5	2.1	1.5
1960	−1.3	2.6	1.8
1961	26.1	5.8	0.8
1962	−10.5	4.0	1.8
1963	21.2	5.3	1.6
1964	15.5	6.0	1.0
1965	10.2	6.0	2.3
1966	−13.3	2.7	3.2
1967	21.3	4.6	2.7
1968	6.8	2.8	4.3
1969	−13.5	−0.2	5.0
1970	−0.4	3.4	4.4
1971	10.5	5.7	3.8
1972	15.4	5.8	3.6
1973	−22.6	−0.6	7.9
1974	−37.3	−1.2	10.8
1975	31.2	5.4	6.0
1976	19.1	5.5	4.7
1977	−13.1	5.0	5.9
1978	−1.3	2.8	7.9
1979	8.6	−0.3	9.8
1980	−22.2	2.6	10.2
1981	−12.2	−1.9	7.3

(a)Regress RR_t on OG_{t+1} and Inf_t
(b)Apply Durbin Watson test and give your conclusion
(c)If you suspect autoregressive of order p, Use the BG test to detect autocorrelation , decide value of p before BG test

Workout

Putting data in R

```
RR=c(53,31.2,3.7,-13.8,41.7,10.5,-1.3,26.1,-10.5,21.2,15.5,10.2,-13.3,21.3,6.8,
     -13.5,-0.4,10.5,15.4,-22.6,-37.3,31.2,19.1,-13.1,-1.3,8.6,-22.2,-12.2)
G=c(6.7,2.1,1.8,-0.4,6,2.1,2.6,5.8,4,5.3,6,6,2.7,4.6,2.8,-0.2,3.4,5.7,5.8,-0.6,
    -1.2,5.4,5.5,5,2.8,-0.3,2.6,-1.9)
I=c(-0.4,0.4,2.9,3,1.7,1.5,1.8,0.8,1.8,1.6,1,2.3,3.2,2.7,4.3,5,4.4,3.8,3.6,7.9,
    10.8,6,4.7,5.9,7.9,9.8,10.2,7.3)
```

Regressing RR_t on OG_{t+1} and Inf_t and calculating RSS

```r
x<-cbind(rep(1,27),G[-1],I[-28])
y<-RR[-28]
beta<-solve(t(x)%*%x)%*%t(x)%*%y      #Regression coefficient
RSS<-t(y-x%*%beta)%*%(y-x%*%beta)     #RSS
print(beta)
```

```
##            [,1]
## [1,] 28.807903
## [2,] -1.213344
## [3,] -4.603319
```

```r
print(RSS)
```

```
##           [,1]
## [1,] 6673.795
```

Applying Durbin Watson test

```r
u<-y-x%*%beta
d1<-sum((u[-1]-u[-27])^2)
d2<-sum(u^2)
d<-d1/d2
print(d)
```

```
## [1] 2.057584
```

Conclusion
From the table we got $d_l = 1.019$ and $d_u = 1.319$ and $4 - d_u$ is given by 2.681 hence our calculated d falls between $d_u = 1.319$ and $4 - d_u = 2.681$ so we can conclude there is not any autocorrelation