Statistics-III – Assignment 6

For the period 1965 to 1977, the number of days on which ozone levels exceeded federal standards for 1 hour or more in the San Francisco Bay area showed a decline of about 5% per year, but with large unexplained fluctuations. One possible cause of the fluctuations might be the weather from the previous year or two years. For example, winter precipitation might influence summer ozone levels. The following data are available, where
YEAR = Year of ozone measurement
RAIN = Average winter precipitation in cms. in the San Francisco Bay area for the preceding two winters
SF = Summer quarter maximum hourly average ozone reading in ppm. at San Francisco
SJ = Summer quarter maximum hourly average ozone reading in ppm. at San Jose

Study the regression models of SF and SJ on YEAR and RAIN. You may use R for this.

YEAR	RAIN	SF	SJ
1965	18.9	4.3	4.2
1966	23.7	4.2	4.8
1967	26.2	4.6	5.3
1968	26.6	4.7	4.8
1969	39.6	4.1	5.5
1970	45.5	4.6	5.6
1971	26.7	3.7	5.4
1972	19.0	3.1	4.6
1973	30.6	3.4	5.1
1974	34.1	3.4	3.7
1975	23.7	2.1	2.7
1976	14.6	2.2	2.1
1977	7.6	2.0	2.3

(a) Construct the ANOVA tables.
(b) For the SF model, provide 95% level confidence intervals for the regression coefficients of RAIN and YEAR (say β_r and β_y), and also for the difference $\beta_r - \beta_y$.
(c) Compute R^2 for both models and explain what these mean.
(d) Compute estimates for the error variance for both models and comment.