Q3 (20 points)

Q3(20 points). Apply SAS to work on the following sample data.

x_1	x_2	y
1.43	2.79	1.23
7.90	5.59	6.12
-3.40	3.58	-1.90
52.87	9.73	44.61
54.39	9.32	41.28
4.70	0.13	10.56
39.68	8.91	34.78
21.75	7.03	16.57
12.62	6.46	10.09
-1.85	2.97	2.01

$\alpha = 0.01$ Find the following information from the SAS output.

1.Fit the data to linear regression model $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_2^2 + \epsilon$.

a. (3 points)Specify the least squares point estimators on your output.

b. (3 points)Implement an F-test for a portion of the model: $H_0 : \beta_2 = \beta_3 = 0$, H_a : at least one of β_2, β_3 is not 0. Specify the test statistic $F(x_2, x_2^2|x_1)$ value and P-value on your output, and make conclusion.

c. (4 points)Code to display $\tilde{X}'\tilde{X}, (\tilde{X}'\tilde{X})^{-1}, \tilde{X}'\tilde{y}, \tilde{y}'\tilde{y}$, specify these matrices/vectors/numbers on your output.

d. (3 points)Implement a Durbin-Watson test for first-order autocorrelation test (H_0: no autocorrelation, H_a: positive autocorrelation). Specify the value of the test statistic and P-value on your output and give the conclusion.

e. (2 points)Use the "Residual by Regressors for y" panel of the regression model output to validate the constant variance assumption.

f. (2 points)Calculate the prediction of y_0 for $x_{01} = 10, x_{02} = 5$.

2 (3 points) Fit the data to linear regression model $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 * x_2 + \epsilon$, compare this with the above model (in sub-question 1.) using multiple coefficients of determination R^2.