Q2(24 points). Apply SAS to work on the following sample data, both SAS code and output are required.

x_i	y_i
8.3	1.3
3.4	18.3
4.5	14.4
6.0	9.0
6.1	9.5
6.4	7.9
5.8	10.2
4.8	13.9
7.1	5.5
9.1	-1.1
8.7	0.0
5.0	12.9
8.2	2.2
3.6	17.6
8.9	-0.2
5.7	10.7
6.1	9.4
5.7	10.5
4.2	15.1
4.2	15.9

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

1. (2 points) Fit the data to a simple linear regression model, find the least squares point estimates for β_0, β_1.
2. (1 points) Plot of the data with the regression line.
3. (4 points) Find SS_T, SS_R, SS_{Res}, $\hat{\sigma}^2$.
4. (2 points) Find the 99% confidence intervals for β_0, β_1.
5. (3 points) Apply a t-test to test $H_0 : \beta_1 = 0, \;\; H_a : \beta_1 \neq 0$. Specify the test statistic's value and P-value, and make conclusion.
6. (3 points) Apply a t-test to test $H_0 : \beta_0 = 0, \;\; H_a : \beta_0 \neq 0$. Specify the test statistic's value and P-value, and make conclusion.
7. (3 points) Find the prediction value, 99% confidence interval, and 99% prediction interval for y, given $x = 7.1$.
8. (1 points) Find the simple coefficient of determination.
9. (3 points) Apply a F-test to test $H_0 : \beta_1 = 0, \;\; H_a : \beta_1 \neq 0$. Specify the test statistic's value and P-value, and make conclusion.
10. (2 points) Find the value of $\hat{\sigma}\sqrt{c_{00}}, \hat{\sigma}\sqrt{c_{11}}$.
11. (1 points) Find $\hat{\sigma}\sqrt{h_{00}}$ and residual for $x = 7.1$.
12. (1 points) Compare the test statistics' value in 5 and 9, what is the relation between these two values?