QUESTION ONE

The following table shows data for a certain relation with the dependent variable Y and two explanatory variables, a dummy D and X.

Y_i	D_i	X_i
20	1	3
30	1	4
10	0	1
5	0	1
15	0	2
25	1	5
20	0	4
10	0	2
40	1	5
25	1	3

(a)   Estimate the regression model using the matrix approach.   [14 Marks]

(b)   Test for the significance of the coefficients at 5% level   [17 Marks]

QUESTION TWO

Using the data in question one, answer the following:

(a)   Obtain the coefficient of determination and interpret its value.   [8 Marks]

(b)   Test for overall significance of regression at 5% level.   [8 Marks]

(c)   Determine 95% confidence interval for the population parameter for X and interpret it.

                                                                                      [7 Marks]

QUESTION THREE

(a)   Consider the following regression results: $\ln \hat{Y}_t = 2.4 + 7.8 \ln X_t$

        (i)   Interpret the estimate of the intercept 2.4.   [2 Marks]

        (ii)   Interpret the estimate for the slope 7.8   [4 Marks]

        (iii)   What is predicted or fitted when X = 30?   [2 Marks]

(b)   Given a multiple regression model, show algebraically that the OLS estimator is unbiased.

                                                                                      [5 Marks]

(c)   Explain how you would test for existence of heteroscedasticity by use of White test.

                                                                                      [10 Marks]

QUESTION FOUR

(a)   A regression model of the demand for a financial asset is given as a function of its return (in
        %). The values of quantity demanded were given in 000's while return is in %. The estimated
        model is given as $\hat{D}_t = 914.247 + 18.501 return_t$.

        (i)   Obtain regression equation in terms of absolute values of quantity demanded.

                                                                                      [4 Marks]

        (ii)   Obtain regression equation with return in decimals instead of %.   [4 Marks]

(b)   (i)   What would be the consequence for a regression model if the errors were not

                 homoscedastic?   [7 Marks]

        (ii)   How might you proceed if you found that (i) were actually the case?   [8 Marks]

QUESTION FIVE

(a)   List the conditions under which Durbin-Watson test is valid for no autocorrelation.

[6 Marks]

(b)   An econometrician suspects that the residuals of his model might be autocorrelated. Explain the steps involved in testing this theory using the Durbin-Watson test.   [6 Marks]

(c)   The following auxiliary regression was estimated in two-explanatory variable case.

$$\hat{u}_t = \hat{\alpha}_0 + \hat{\alpha}_1 X_{1t} + \hat{\alpha}_2 X_{2t} + \hat{\alpha}_3 u_{t-1} + \hat{\alpha}_4 u_{t-2}, \quad R^2 = 0.96$$

   (i)   Test for autocorrelation at 5% level.   [6 Marks]

   (ii)   If autocorrelation is present, how would correct for it.   [5 Marks]

QUESTION SIX

(a)   The following equation describes the median housing price in a community in terms of amount of pollution (*nox* for nitrous oxide) and the average number of rooms in houses in the community (rooms):

$$\ln price_t = 9.23 - 0.718\,nox_t + 0.306\,rooms_t, \quad R^2 = 0.514$$

Interpret coefficient of the variable rooms   [4 Marks]

(b)   A regression model was estimated with five explanatory variables and results were

$$\ln \hat{Y}_t = 11.10 + 0.0126 X_{1t} + 0.29 X_{2t} + 0.0026 X_{3t} + 0.00098 X_{4t} + 0.0072 X_{5t},$$
$$R^2 = 0.63 \text{ and SSR} = 183.186, n = 353$$

Another regression was done with only two variables as follows

$$\ln \hat{Y}_t = 11.22 + 0.0713 X_{1t} + 0.0202 X_{2t}$$
$$R^2 = 0.60 \text{ and SSR} = 198.311$$

Test for linear restriction at 5%.   [8 Marks]

(c)   (i)   What is mutlicollinearity?   [3 Marks]

   (ii)   What would done when multicollinearity is present. Explain.   [6 Marks]