44-6873-00L- **Econometrics for Business and Economics**	Dr Amr Algarhi (Miro) Department of Management Sheffield Hallam University
Exercise sheet **2. Simple linear regression model** Week 13	

Question 1. Based on data for years 1962 to 1977 for the United States, the following demand function for automobiles was obtained

$$\hat{Y}_t = 5807 + 3.24X_t$$

$$R^2 = 0.22$$

where Y is the retail sales of passenger cars (in thousands of dollars) and X is the real disposable income (in billions of 1972 dollars) and the subscript t stands for time.

(a) Interpret the slope parameter.

(b) How do you interpret the coefficient of determination?

Question 2 (Stata). Download the "***food.dta***" file, which includes data for weekly household food expenditure and weekly household income. The variable $food\_exp$ is the weekly household food expenditure (in pounds); this is the variable we would like to explain. The variable $income$ is the weekly household income (in hundreds of pounds).

(a) Compute summary statistics for the underlying variables, and then create a scatter diagram.

(b) Estimate the simple linear regression equation

$$\widehat{food\_exp}_i = \hat{\beta}_1 + \hat{\beta}_2 income_i$$

(c) Interpret the intercept in your equation. Interpret the coefficient of $income$.

(d) Compute the fitted values and the residuals.

(e) Plot the fitted regression line.

(f) Find the predicted $food\_exp$ when $income = 20$.

(g) How much of the variation in $food\_exp$ is explained by $income$? Is this a lot in your opinion?

Question 3 (Stata). Use the data in "***sleep75.dta***" from Biddle and Hamermesh (1990) to study whether there is a trade-off between the time spent sleeping per week and the time spent in paid work. We could use either variable as the dependent variable. For concreteness, estimate the model

$$sleep_i = \beta_1 + \beta_2 totwrk_i + u_i$$

where $sleep$ is minutes spent sleeping at night per week and $totwrk$ is total minutes worked during the week.

(a) Report your results in equation form along with the number of observations and R^2. What does the intercept in this equation mean?

(b) If *totwrk* increases by 2 hours, by how much is *sleep* estimated to fall? Do you find this to be a large effect?

Question 4 (Stata). Suppose an economist, who is interested in the relationship between hourly wages (Y) and years of schooling (X), has collected the following data of five individuals.

i	X	Y (£)
1	10	4.5
2	12	5
3	14	5.5
4	16	5.8
5	18	6.7

(a) Compute summary statistics for the underlying variables, then create a scatter diagram.

(b) Estimate the simple linear regression function.

(c) Compute the fitted values and plot the sample regression function.

(END)