Middle East Technical University **2010-2011 Fall**
Department of Economics
ECON 206

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PROBLEM SET 07

PROBLEM 1

Suppose a researcher wants to estimate the parameters in the simple population equation

$Y = \beta_0 + \beta_1 X + u$

The following data which were calculated from a sample of 10 observations are available.

$\Sigma Y = 580$	$\Sigma xy = -654$
$\Sigma X = 50$	$\Sigma y^2 = 7568$
$\Sigma XY = 2246$	$\Sigma x^2 = 60$
$\Sigma Y^2 = 41208$	
$\Sigma X^2 = 310$	

a. Obtain least square estimates of β_0 and β_1.
b. Compute R^2. Given an interpretation for the coefficients of determination.
c. Test if the model must have an intercept term (take $\alpha = 0.05$).
d. Test if the slope coefficient is different from zero (take $\alpha = 0.05$).
e. Construct the 99 % confidence interval for β_1.

PROBLEM 2

Suppose you want to estimate the following export supply function for commodity *Z*:

$$Y_t = b_0 + b_1 X_t + u_t$$

Given the following information for 10 years:

$$\bar{X} = 5,\ \bar{Y} = 6,\ \sum X_t Y_t = 353,\ \sum X_t^2 = 304,\ \sum Y_t^2 = 428,$$

where, Y_t = Quantity supplied for exports of commodity *Z* (mil. tons)
X_t = Export price ($ per ton)

a. Obtain the OLS estimates of b_0 and b_1.
b. Compute R^2. Give an interpretation for the coefficients of determination.
c. Test the hypothesis that the quantity supplied and the price is positively related (Take α=0.05).
d. Test if export supply function should have an intercept term (Take α=0.05).

PROBLEM 3

Consider the following demand function for chicken (1960-1982):

$$\ln Y_t = \beta_0 + \beta_1 \ln X_{t1} + \beta_2 \ln X_{t2} + \beta_3 \ln X_{t3} + \beta_4 \ln X_{t4} + u_t$$

where Y = per capita consumption of chicken, X_1 = real disposable per capita income, X_2 = real retail price of chicken, X_3 = real retail price of pork, and X_4 = real retail price of beef.

You are given the following regression results.

(Model 1) $$\widehat{\ln Y_t} = \underset{(0.1557)}{2.1898} + \underset{(0.0833)}{0.3425}\, X_{t1} - \underset{(0.1109)}{0.5046}\, X_{t2} + \underset{(0.0997)}{0.1485}\, X_{t3} + \underset{(0.1007)}{0.0911}\, X_{t4}$$

SSR=0.013703, R^2=0.98231

(Model 2) $$\widehat{\ln Y_t} = \underset{(0.1162)}{2.0328} + \underset{(0.0247)}{0.4515}\, X_{t1} - \underset{(0.0635)}{0.3772}\, X_{t2}$$

SSR= 0.015437, R^2=0.98007

(Model 3) $$\widehat{\ln Y_t} = \underset{(0.1798)}{1.4910} + \underset{(0.1260)}{0.18260}\, X_{t3} - \underset{(0.1260)}{0.28695}\, X_{t4}$$

SSR= 0.089951, R^2=0.88390

(Model 4) $$\widehat{\ln Y_t} = \underset{(0.0391)}{3.6639}$$

SSR= 0.77475, R^2=?

a. Test the significance of each terms individually in Model (1) (Take α=0.05).
b. Test joint significance of the slope terms in Model (1) (Take α=0.05).
c. What do the coefficients of X_1, X_2, X_3 and X_4 (i.e., β_1, β_2, β_3, and β_4) denote in economic theory?
d. What is your theoretical expectation about the sign of β_1? Test your *claim* at 0.05 level of significance using Model (1).
e. Suppose someone *claims* that chicken and beef are *complementary* products. Test this claim at 0.05 level of significance using Model (1).
f. Test the hypothesis that $H_0{:}\beta_3=\beta_4=0$ and interpret your results. (Take α=0.05).
g. What would be the R^2 of Model (4)?