Quantitative Method (I)

Department of Economics

National Taipei University

Fall 2017

Final Exam

(Held in Class on Jan. 10)

Student Name:

Student ID Number:

Note 1: any electronic device is not allowed during the entire exam.

Note 2: return all the exam papers when returning the exam papers.

1. What is the quasi maximum likelihood estimator? (10 points)

2. **Clearly explain** (i) how heteroscedasticity influences the properties of the least-squares estimator, (ii) what test can be used to detect this problem, and (iii) what method can be used to solve this probelm. Provide **one** test and **two** solutions for the last two questions, respectively. (40 points)

3. You are interested in a demand equation of $\ln(y_i) = \beta_1 + \beta_2 \ln(p_i) + \beta_3 \ln(m_i) + u_i$, where y is quantity, p is price and m is income. You obtain the estimates $\widehat{\beta}_2 = -0.45$, $\widehat{\beta}_3 = 1.25$, $\widehat{Var(\widehat{\beta}_2)} = 0.09$, $\widehat{Var(\widehat{\beta}_3)} = 0.04$, and $n = 43$. Note: the statistical tables are attached at the end of the exam.

   (a) Examine whether the price elasticity is significantly different from zero: H_0: $\beta_2 = 0$ using t test at the 10% level. (10 points)

   (b) Examine whether the income elasticity is significantly greater than one: H_0: $\beta_3 \leq 1$ using t test at the 5% level. (10 points)

4. Annual data for 1946-1963 (18 observations) in the United Kingdom are obtained for personal savings y and personal income x. A saving function is estimated for the whole period as

$$\widehat{y}_t = -1.0821 + 0.1178x_t$$

$$R^2 = 0.9185,\ s^2 = 0.0358$$

The regression for the subperiod 1946-1954 is

$$\widehat{y}_t = -0.2622 + 0.0470x_t$$

$$R^2 = 0.3092,\ s^2 = 0.0199$$

The regression for the subperiod 1955-1963 is

$$\widehat{y}_t = -1.7502 + 0.1504x_t$$

$$R^2 = 0.9131,\ s^2 = 0.0276$$

Examine whether the saving functions are significantly different over the two subperiods using F test at the 5% level. Hint: $s^2 = \frac{RSS}{n-k}$. (20 points)

5. Suppose a n-by-two matrix $X = [\underline{i}, \underline{x}_2]$, where $\underline{i}$ is a unit vector and x_2 is an independent variable, show $X(X'X)^{-1}X'\underline{i} = \underline{i}$. (10 points)