

系別：財務金融學系 B 組

科目：統計學

准帶項目請打「V」

✓

簡單型計算機

本試題共 1 頁，3 大題

1. (40 points) In multiple regression, the following three conditions would affect the results we obtain from the regression. Please define the three conditions, discuss their effects on the regression results, and provide a solution to the problem.
- Multicollinearity
  - Heteroskedasticity
  - Autocorrelation

2. (30 points) Assume that  $Y$  is a random variable with the following p.d.f.

$$f(y) = \begin{cases} 3y^2 & \text{for } 0 \leq y \leq 1, \\ 0 & \text{otherwise.} \end{cases}$$

- Find the value of  $E(Y)$  and the value of  $\text{Var}(Y)$ .
- Find the value of  $t$  such that  $\Pr(Y > t) = 1/2$ .
- Suppose that  $X$  is also a random variable and  $X$  and  $Y$  have a continuous joint distribution with the following p.d.f. Are  $X$  and  $Y$  independent?

$$f(x, y) = \begin{cases} \frac{2}{3}y^2 & \text{for } 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 1, \\ 0 & \text{otherwise.} \end{cases}$$

3. (30 points) Consider a regression model,  $Y_i = a + bX_i + \varepsilon_i$ , for which all the classical regression assumptions hold.
- Find the expected value and the variance of the residuals,  $\varepsilon_i$ .
  - List four assumptions of the classical regression model.
  - What is the  $R^2$ ? And what is the purpose of calculating  $R^2$ ?