

注意：(1) Part I 有 10 題填充題，請自行製作答題區。規定如下：請於作答區第一頁「選擇題作答區」的下方製作第 1 - 10 格答題區。每格答對得 5 分，答錯或未作答 0 分。

第 1 格	第 2 格	第 3 格	第 4 格	第 5 格
第 6 格	第 7 格	第 8 格	第 9 格	第 10 格

(2) 答題不要求任何計算過程，只依答案格內的答案對錯給分。

(3) 如果沒有特別指示，請將答案約分至最簡分數表示。

Part I：填充題（每格 5 分，共 50 分）

A. Suppose that random variable Y has a probability density function given by

$$f(y) = \begin{cases} k(1-y)y^2, & 0 \leq y \leq 1, \\ 0, & \text{elsewhere,} \end{cases}$$

then $k =$ (1). The expected value of the random variable Y is (2); the variance of Y is (3). The expected value of Y^{-1} is (4).

B. Suppose random variable Y has a **binomial** distribution with n trials and probability of success p , where $0 < p < 1$. The variance of random variable Y is (5). Its moment generating function (MGF) [Hint: $m(t) = E(e^{tY})$] is (6); its probability generating function (PGF) [Hint: $P(t) = E(t^Y)$] is (7). (答案請用符號回答)

(請翻次頁，繼續作答)

- C. 牛經理發現其所任職的公司的人員，平常都用四種中文輸入法（注音、倉頡、大易、速成）之一來進行文書處理，牛經理想知道這四種輸入法的輸入速度是否相同。經隨機抽選部份人員調查其每分鐘打字的字數後，牛經理得到下列變異數分析表。

變異來源	自由度	平方和	平均平方和	F 值
輸入法	(A)	(C)	104	(F)
隨機變異	(B)	(D)	(E)	
總變異	43	1912		

根據此一變異數分析表的結果，請計算：

$$(F) \times 5 - (A) = \underline{\quad(8)\quad};$$

$$(B) + (E) = \underline{\quad(9)\quad};$$

$$(D) - 5 \times (C) = \underline{\quad(10)\quad}.$$

(請翻次頁，繼續作答)

注意：(1) Part II 有六大題計算問答說明題，請從答案卷第二頁之後作答。

(2) 請標示清楚，並將所有過程、步驟交代清楚；沒有說明過程者，甚者只給簡單回答如 Yes、No 等，不給分。每大題之下的小題分數，如括號內所示。

Part II：計算問答說明題 (50 分)

1. (30%) Consider the following linear model:

$$Y_i = \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_i,$$

where $\varepsilon_i \stackrel{i.i.d}{\sim} N(0, \sigma^2)$ and $i = 1, \dots, n$.

(a) Find the ordinary least squares (OLS) estimators, $\hat{\beta}_1$ for β_1 and $\hat{\beta}_2$ for β_2 . (10%)

(b) Will the OLS regression line pass through the origin? Why or why not? (5%)

(c) Write down the log-likelihood function for the sample $\{(Y_i, X_{1i}, X_{2i})\}_{i=1}^n$. (5%)

(d) Are the maximum likelihood (ML) estimators for β_1 and β_2 the same as the OLS estimators for β_1 and β_2 ? Why or why not? (5%)

(e) What is the ML estimator for σ^2 ? (5%)

(請翻次頁，繼續作答)

2. (20 %) Consider the Cobb-Douglas production function, $Q = AK^{\beta_K}L^{\beta_L}e^u$. Suppose the following result is obtained based on the sample with 25 observations: (Values in the parentheses are the standard errors.)

$$\ln Q = 1.58 + 0.61 \ln K + 0.48 \ln L,$$

$$(0.5) \quad (0.3)$$

$$R^2 = 0.85, \text{Cov}(\hat{\beta}_K, \hat{\beta}_L) = 0.01.$$

Suppose the level of significance is α , answer the questions (a) and (b). (Use notation for the critical values; e.g., Z_α .)

- (a) How can we conduct the hypothesis test: $H_0: \beta_K = 0$ and $\beta_L = 0$? Use the above result to compute the test statistic. What's your decision rule? (10%)
- (b) How can we test the hypothesis that there is constant return to scale? Write down the null hypothesis and compute the test statistics. What's your decision rule? (10%)