

NATIONAL CHENGCHI UNIVERSITY EXAMINATION FORM

系別	應用數學系	考試 科目	數理統計	考試 日期	2023 年 2 月 20 日	考試 時間	13:00 至 16:00
----	-------	----------	------	----------	-----------------	----------	---------------

注意事項

- 務必作答於答案卷並標明題號，請勿作答於試題卷上，否則不予計分。
- 本試題卷共有 5 個問題，總計 100 分。

Please provide clear answers for each question of the exam

- (10 %) $g(x) : R \rightarrow R$ is a continuous function and $X_n \rightarrow^d X$ (converge in distribution). Please show $g(X_n) \rightarrow^d g(X)$.
- (35 %) Let X_1, X_2, \dots be a sequence of independent random variables with $X_i \sim U(0, \theta)$ ($U(0, \theta)$: the uniform distribution on $(0, \theta)$, $\theta > 0$).
 - (15 pts) Find the sufficient and complete statistic of θ .
 - (20 pts) Find the UMVUE of θ . (UMVUE: Uniformly Minimal Variance Unbiased Estimator)
- (20 %) Let X_1, X_2, \dots be a sequence of independent random variables with $X_i \sim N(\mu, \sigma^2)$. Please find the $(1 - \alpha)\%$ confidence interval of σ^2 .
- (15 %) Let X_1, X_2, \dots be a sequence of independent random variables with $X_i \sim P(\theta)$ (P : the Poisson distribution with mean θ). Please the maximum likelihood estimator of θ .
- (20 %) Let X_1, X_2, \dots be a sequence of independent random variables with $X_i \sim U(\theta, \theta+1)$ ($U(\theta, \theta+1)$: the uniform distribution on $(\theta, \theta+1)$, $\theta \in R$). Please find the uniformly most powerful test (UMP) for $H_0 : \theta \leq 0$ versus $H_1 : \theta > 0$.

命題老師簽章：

(Teacher's Signature)

日期：

(Date)

年 月 日

■ 試題隨卷繳交

■ 不可使用計算機

命題紙使用說明： 試題將用原件印製，敬請使用黑色墨水正楷書寫或打字(紅色不能製版請勿使用)。

Remarks : For the convenience of reprinting please Write questions in black or blue-black (but no red) ink.