

國立政治大學 110 學年度第 1 學期 期中考 考試命題紙

考試科目：統計學（一）

開課班別：統計學整合開課

命題教授：吳漢銘

考試日期：11 月 16 日（二）13:10-14:30

※准帶項目打「O」，否則打「×」

1. 需加發計算紙或答案紙請在試題內封袋備註。
2. 為環保節能減碳，試題一律採雙面印刷，如有特殊印製需求，請註記：

本試題共 2 頁，印刷份數：112 份

計算機	課本	筆記	字典	手機平板筆電
O	×	×	×	×

備註：注意事項要看!! (§1~§5)

**注意事項：**(1) 答案卷請寫上姓名及學號。(2) 請按題號順序書寫。(3) 每一題號需置於答案卷最左邊。(4) 中英文作答皆可。(5) 可用鉛筆。(6) 需要計算過程。(7) 同時交回答案卷、題目卷、計算紙。(8) 總分共 100 分。

1. (20%) **統計名詞解釋：**

- (a) 機率 (Probability)
- (b) 貝氏定理 (Bayes' Theorem) (請列出公式後解釋)
- (c) 隨機變數 (Random Variable)
- (d) 機率分佈 (Probability Distribution)

2. (40%) **問答題：**

- (a) 對於一個連續型 (Continuous) 或是屬量 (Quantitative) 變數的資料，如何定義其次數分佈？
- (b) 試舉出一個生活中，二項式實驗 (Binomial Experiment) 的例子，並說明它有滿足四項二項式實驗的性質。(禁止舉「丟銅板」的例子)
- (c) 何謂「二項式分佈 (Binomial Distribution)」？何謂「超幾何分佈 (Hypergeometric Distribution)」？兩者有何相同和不相同之處？
- (d) 木柵小宅哥是系邊，中午吃飯沒人揪，只好一人到集英樓買便當。突然間統計魂上身，他想知道十分鐘內來買當便的人數是否可以用卜瓦松分佈 (Poisson Distribution) 來描述，請身為同學的你發揮同學愛，幫忙解釋一下「是否可以」？可能的可能原因是什麼，若不可，那可能原因又是什麼？(請以卜瓦松實驗的特性 (Properties of a Poisson Experiment) 來解釋)

3. (10%) **Golf Equipment Website Visitors.** ParFore created a website to market golf equipment and golf apparel. Management would like a special pop-up offer to appear for female website visitors and a different special pop-up offer to appear for male website visitors. From a sample of past website visitors, ParFore's management learned that 60% of the visitors are male and 40% are female.

- (a) What is the probability that a current visitor to the website is female?
- (b) Suppose 30% of ParFore's female visitors previously visited the Dillard's department store website and 10% of ParFore's male visitors previously visited the Dillard's department store website. If the current visitor to ParFore's website previously visited the Dillard's website, what is the revised probability that the current visitor is female? Should the ParFore's website display the special offer that appeals to female visitors or the special offer that appeals to male visitors?

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4. (10%) **MBA New-Matriculants Survey.** An MBA new-matriculants survey provided the following data for 2018 students.

Age Group	Applied to More Than One School	
	Yes	No
23 and under	207	201
24–26	299	379
27–30	185	268
31–35	66	193
36 and over	51	169

- (a) For a randomly selected MBA student, prepare a joint probability table for the experiment consisting of observing the student's age and whether the student applied to one or more schools.
- (b) What is the probability that a randomly selected applicant applied to more than one school?
5. (10%) **Motor Vehicle Accidents in New York City.** In a one-year period (52 weeks), New York City had a total of 11,232 motor vehicle accidents that occurred on Monday through Friday between the hours of 3 p.m. and 6 p.m. (New York State Department of Motor Vehicles website).
- (a) Compute the probability of no accidents in a 15minute period.
- (b) Compute the probability of four or more accidents in a 15minute period.
6. (10%) **Computer Company Benefits Questionnaire.** Axline Computers manufactures personal computers at two plants, one in Texas and the other in Hawaii. The Texas plant has 40 employees; the Hawaii plant has 20. A random sample of 10 employees is to be asked to fill out a benefits questionnaire.
- (a) What is the probability that two or more of the employees in the sample work at the plant in Hawaii?
- (b) What is the probability that 9 of the employees in the sample work at the plant in Texas?

注意：1、考試求公平及公正，請同學務必自律，維護學校與學生之榮譽。

2、考試時不得有交談、窺視、夾帶、抄襲、傳遞、代考或其它作弊等舞弊行為，考畢務必交卷，不得攜卷出場，違者依考場規則議處。