

國立政治大學 111 學年度第 1 學期 小考 (1) 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：10 月 18 日 (四) 14:10-15:50

※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3頁，印刷份數：90 份

計算機	課本	筆記	字典	手機平板筆電
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備註：注意事項要看!! (範圍: §ch1~4)

注意事項: (1) 答案卷請寫上科目、系級、學號及姓名。(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) 建議用深色原子筆。(6) 需要計算過程。(7) 總分共 120 分。(8) 請複寫下列宣誓詞至答案卷第一頁最上頭。

本人姓名 重視榮譽，以認真負責的態度，參與於本次 (線上遠距) 考試，恪遵各項考試規則，無任何不法或舞弊情事，如違誓言，願受校方最嚴厲之處罰，謹誓。

1. (15%) 名詞解釋 (不能只列出公式，需說明所使用符號的意思及公式代表的意義):

- (a) 統計學 (statistics)
- (b) 統計推論 (statistical inference)
- (c) 樣本空間 (sample space)
- (d) 聯合機率 (joint probability)
- (e) 獨立事件 (independent events)

2. (45%) 簡答題/問答題

- (a) (10%) 依課本所述，測量尺度 (scales of measurement) 有哪四種類型？每一種類型請各舉 2 個例子。
- (b) (5%) 收集樣本 (sample) 的目的為何？
- (c) (5%) 何謂「以相對次數法 (relative frequency method) 給予隨機實驗每一個結果一個機率值 (assigning probabilities)」？
- (d) (5%) 當我們在進行敘述統計，想了解一數值資料的分佈形狀 (distribution shape) 時，可採用 Chebyshev's Theorem 或 Empirical rule。請問何謂「Empirical rule」？適用於哪類型的資料？
- (e) (20%) 大學新生入學，校方紀錄了新生的資料，假設此資料中僅有性別 (男、女、未告知)、入學管道 (繁星推薦、個人申請、考試入學)、身高及體重等變數，若您想對此資料進行敘述統計 (descriptive statistics)，請依課本所述，應如何進行。(提示：進行 VVV 處理，或計算 OOO(數值/統計量)，或繪製 XXX 圖表，以了解 YYY。)

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3. (20%) **Golf Course Complaints.** Recently, management at Oak Tree Golf Course received a few complaints about the condition of the greens. Several players complained that the greens are too fast. Rather than react to the comments of just a few, the Golf Association conducted a survey of 100 male and 100 female golfers. The survey results are summarized here.

Male Golfers			Female Golfers		
Greens Condition			Greens Condition		
Handicap	Too Fast	Fine	Handicap	Too Fast	Fine
Under 15	10	40	Under 15	1	9
15 or more	25	25	15 or more	39	51

- (a) (5%) Combine these two crosstabulations into one with Male and Female as the row labels and Too Fast and Fine as the column labels. Which group shows the highest percentage saying that the greens are too fast?
- (b) (5%) Refer to the initial crosstabulations. For those players with low handicaps (better players), which group (male or female) shows the higher percentage saying the greens are too fast?
- (c) (5%) Refer to the initial crosstabulations. For those players with higher handicaps, which group (male or female) shows the higher percentage saying the greens are too fast?
- (d) (5%) What conclusions can you draw about the preferences of men and women concerning the speed of the greens? Are the conclusions you draw from part (a) as compared with parts (b) and (c) consistent? Explain any apparent inconsistencies.

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4. (20%) **Apple iPads in Schools.** The New York Times reported that Apple has unveiled a new iPad marketed specifically to school districts for use by students (The New York Times website). The 9.7-inch iPads will have faster processors and a cheaper price point in an effort to take market share away from Google Chromebooks in public school districts. Suppose that the following data represent the percentages of students currently using Apple iPads for a sample of 18 U.S. public school districts ($x_i, i = 1, \dots, 18$). ($\sum x_i = 444, \sum x_i^2 = 13346$.)

15 22 12 21 26 18 42 29 64 20 15 22 18 24 27 24 26 19

- (a) (5%) Compare the first and second quartiles for these data.
 - (b) (5%) Compute the variance and standard deviation for these data.
 - (c) (5%) Are there any outliers in these data?
 - (d) (5%) Based on your calculated values, what can we say about the percentage of students using iPads in public school districts?
5. (20%) **Treatment-Caused Injuries.** A study of 31,000 hospital admissions in New York State found that 4% of the admissions led to treatment-caused injuries. One-seventh of these treatment-caused injuries resulted in death, and one-fourth were caused by negligence. Malpractice claims were filed in one out of 7.5 cases involving negligence, and payments were made in one out of every two claims.
- (a) (5%) Represent the events indicated in this problem using letters or symbols.
 - (b) (5%) What is the probability a person admitted to the hospital will suffer a treatment-caused injury due to negligence?
 - (c) (5%) What is the probability a person admitted to the hospital will die from a treatment-caused injury?
 - (d) (5%) In the case of a negligent treatment-caused injury, what is the probability a malpractice claim will be paid?

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。