

國立臺灣科技大學 111 學年度碩士班招生試題

系所組別：企業管理系碩士班

科目：統計學

(總分為 100 分；所有試題務必於答案卷內頁依序作答，否則不予計分)

1. Multiple Choice (25 points)

(1) If the distribution of a variable is positively skewed, then which of the following statements is true: (5 pt.)

- A. mean is larger than the mode
- B. mean is at left to the median
- C. median is less than the mode
- D. mode is at right to the mean

(2) Three cards were drawn from a pack of 52 cards. The probability that they are a K(king), a Q(queen), and an A(ace) is: (5 pt.)

- A. $\frac{3}{13}$
- B. $\frac{64}{2197}$
- C. $\frac{16}{5525}$
- D. $\frac{8}{16575}$

(3) A bag contains 5 black and 5 white balls. What is the probability of drawing two balls of the same color? (5 pt.)

- A. Less than or equal to 0.25
- B. Greater than 0.25, but less than or equal to 0.5
- C. Greater than 0.5, but less than or equal to 0.75
- D. Greater than 0.75

(4) Let X be a continuous random variable with the following PDF: (5 pt.)

$$f_x(x) = \begin{cases} 4x^3 & 0 < x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

The value of $p\left(x \leq \frac{2}{3} \mid x > \frac{1}{3}\right)$ is :

- A. Less than or equal to $\frac{1}{16}$
- B. Greater than $\frac{1}{16}$, but less than or equal to $\frac{1}{4}$
- C. Greater than $\frac{1}{4}$, but less than or equal to $\frac{1}{2}$
- D. Greater than $\frac{1}{2}$



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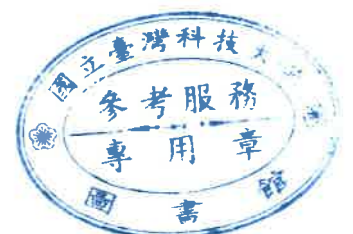
(5) Consider two exponentially distributed random variables X and Y , both having a mean of 0.5. Let $Z=X+Y$ and r be the correlation coefficient between X and Y . If the variance of Z equals 0. The value of r is: (5 pt.)

- A. Less than or equal to -1
- B. Greater than -1 , but less than or equal to 0
- C. Greater than 0, but less than or equal to 1
- D. Not enough information

2. Calculation (25 points)

If A 、 B 、 C are independent events, and $P(A)=0.7$, $P(B)=0.2$, $P(C)=0.4$. Please calculate the following probabilities?

- (1) $P(A \cup B)$ (5 pt.)
- (2) $P(\bar{B} \cup C)$ (5 pt.)
- (3) $P(A \cap B \cap C)$ (5 pt.)
- (4) $P(A \cup B \cup C)$ (5 pt.)
- (5) $P(\bar{A} \cup B \cup C)$ (5 pt.)



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3. True or False (8 points)

- _____ (1). A statistic is defined as a characteristic of a population. (2 pt.)
- _____ (2). The five-number summary refers to the minimum value, the maximum value, the mean, the median, and the standard deviation. (2 pt.)
- _____ (3). The sampling error of the mean is the standard deviation of a sample distribution. (2 pt.)
- _____ (4). The central limit theorem states that as sample size n increases, the sampling distribution of the mean from a random sample of size n more closely approximates a normal distribution. (2 pt.)

4. Short Answer (42 points)

- (1). Which **scale of measurement** is most appropriate for “attained education” when it is measured as

- _____ A. number of years (0, 1, 2, 3, ...)? (2 pt.)
- _____ B. grade level (elementary school, middle school, high school, college, graduate school)? (2pt.)
- _____ C. school type (public school, private school)? (2 pt.)

- (2). What factor determines whether you should use a z-score or a t statistic for a hypothesis test? [Your response should not exceed two (2) sentences.] (6 pt.)
- (3). What is the relationship between the value for degrees of freedom and the shape of the t distribution? [Your response should not exceed two sentences.] (6 pt.)
- (4). What information is provided by the sign (+ or -) of the Pearson correlation? [Write one or two sentences] (6 pt.)



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- (5) What information is provided by the numerical value of the Pearson correlation?
[Write one or two sentences] (6 pt.)
- (6) Describe the homogeneity of variance assumption, and explain why it is important for the independent t test? [Your response should not exceed two sentences.] (6 pt.)
- (7) What is the major distinction between the Pearson and Spearman correlations?
[Write one or two sentences] (6 pt.)

