

國立成功大學

115學年度碩士班招生考試試題

編 號：154

系 所：財務金融研究所

科 目：統計學

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節 次：第 3 節

注 意：1. 可使用計算機
2. 請於答案卷(卡)作答，於
試題上作答，不予計分。

一、選擇題 50 分(每題五分)

1. Two independent random variables with means 6.0 and 8.0 standard deviations 0.3 and 0.4 respectively, the standard deviation of their sum is
- (a) 0.25
(b) 0.5
(c) 0.7
(d) 10.0
2. Given that the moment-generating functions (MGFs) of random variables X and Y are $M_X(t) = 0.36 + 0.48e^t + 0.16e^{2t}$ and $M_Y = 0.6 + 0.4e^t$, respectively, and that X and Y are independent, let a new random variable be $z = X + Y$. Which of the following is correct regarding the parameters of the probability density function of Z ?
- (a) $E(z) = Var(z) = 0.52$
(b) $E(z) = 1.2, Var(z) = 0.72$
(c) $E(z) = 0.88, Var(z) = 0.16$
(d) $E(z) = 0.48, Var(z) = 0.88$
3. A random variable has a χ^2 distribution with 18 degrees of freedom. Its means is:
- (a) 18
(b) three times its standard deviation
(c) unknown
(d) both (a) and (b)
4. Suppose y has a binomial distribution, i.e. $y \sim b(36, 0.5)$ where sample size is 36 and the population success rate is 0.5.
- (a) $E(y) = 18, Var(y) = 9$
(b) $P(12 < y \leq 18) \cong \phi(0.167) - \phi(-1.833)$, where $\phi(\)$ is the distribution function of the standard normal distribution.

(c) $P(11 < y \leq 14) = P(12 \leq y \leq 14)$.

(d) All of the above

5. Consider a Bernoulli process with unknown success rate π . Using a sample of 10 trials of the process, you wish to test the null hypothesis

$$H_0 : \pi \geq 0.60$$

versus the alternative hypothesis

$$H_1 : \pi < 0.60$$

If the 0.05 significance level is used, the null hypothesis will be rejected if, and only if, the number of successes in the 10 trials is

- (a) greater than 3.
- (b) at least 3.
- (c) less than 3.
- (d) no more than 3.

6. Which of the following components in an ANOVA table are not additive ?

- (a) The sum of squares.
- (b) The degrees of freedom.
- (c) The mean squares.
- (d) None of the above.

7. A paired-difference test is a

- (a) Simple example of a chi-square goodness-of-fit test.
- (b) Simple example of a randomized block design.
- (c) Simple example of a completely randomized experiment.
- (d) Simple example of a chi-square homogeneity test.

8. When a qualitative variable is entered into a model by using dummy variables.

- (a) the number of dummy variables entered for the qualitative variables always one less than the number of levels of the qualitative variable.
- (b) only one dummy variable needs to be entered into the model.
- (c) the number of dummy variables entered for the qualitative variable equals the number of values the qualitative variable can assume.

(d) one should not enter a second qualitative variable because there will be too many dummy variables in the model.

9. Which of the following statement is false.

(a) If $Y = 5E(Z)$, then $Var(Y) = 0$, where Z is a normally distributed random variable.

(b) If $Y = 2Var(Z)$, then $E(Y) = Y$, where Z is a normally distributed random variable.

(c) $Var(X) = E(X^2) - (E(X))^2$ only when X is continuous.

(d) none of the above.

10. The domain of the probability measure $P(\)$ is :

(a) $[0, \infty]$

(b) S , the corresponding sample space

(c) subsets of S

(d) $[0, 1]$

二、非選擇題 50分

1. (10%) 已知 $f(x, y) = \frac{1}{36}$, $0 \leq x \leq 6$, $0 \leq y \leq 6$, 請求算 $P[xy > 8 | x + y \leq 6]$.

2. (10%) 某君與女友相約在下午 6~7 時之間於校門口見面, 先到的人應等候 20 分鐘, 未遇上對方即取消此約。試問此約成功的機率為何?

3. (10%) 設 $\{x_i\}$ 為取自下列全體之隨機樣本, 其大小為 n

$$\begin{cases} x \sim f(x) = 1 & 0 \leq x \leq 1 \\ = 0 & \text{其他} \end{cases}$$

令 y_1 為 $\min\{x_i\}$, y_n 為 $\max\{x_i\}$, $R = y_n - y_1$, 求 $f(R)$

4. (10%) 試求卡方(χ^2)分配之動差母函數，並利用求得之結果，確定卡方分配之平均數與變異數。
5. (10%) 設隨機變數 x 分配之期望值 $E(x) = \mu$ ，變異數 $V(x) = \sigma^2$ ，令標準隨機變數 $y = \frac{x - \mu}{\sigma}$ ，試求：
- (1) x 與 y 的相關係數 ρ
 - (2) y 對 x 的迴歸係數 β_1