

大葉大學 九十三 學年度 研究所博士班 招生考試試題紙

系所別	組別	考試科目 (中文名稱)	考試日期	節次	備註
管理研究所博士班	甲	統計學	6月21日	第二節	共四頁 P4-1

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

I. Multiple Choice Questions (1 point for each item):

1. The interquartile range is used as a measure of variability to overcome what difficulty of the range? (1) the sum of the range variances is zero (2) the range is difficult to compute (3) the range is influenced too much by extreme values (4) the range is negative (5) none of the above.
2. The measure of location which is the most likely to be influenced by extreme values in the data set is the (1) range (2) median (3) mode (4) mean (5) none of the above.
3. Qualitative data can be graphically represented by using a(n) (1) histogram (2) frequency polygon (3) ogive (4) bar graph (5) none of the above.
4. The sum of the relative frequencies for all classes will always equal (1) the sample size (2) the number of classes (3) one (4) any value larger than one (5) 100
5. In hypothesis testing, the hypothesis tentatively assumed to be true is (1) the alternative hypothesis (2) the null hypothesis (3) either the null or the alternative (4) All of the above answers are correct (5) none of the above.
6. In hypothesis testing if the null hypothesis is rejected, (1) no conclusions can be drawn from the test (2) the alternative hypothesis must also be rejected (3) the data must have been accumulated incorrectly (4) the sample size has been too small (5) none of the above.
7. A Type II error is committed when (1) a true alternative hypothesis is mistakenly rejected (2) a true null hypothesis is mistakenly rejected (3) the sample size has been too small (4) not enough information has been available (5) none of the above.
8. If a hypothesis is rejected at the 5% level of significance, it (1) will always be rejected at the 1% level (2) will always be accepted at the 1% level (3) will never be tested at the 1% level (4) may be rejected or not rejected at the 1% level (5) none of the above.
9. If the level of significance of a hypothesis test is raised from .01 to .05, the probability of a Type II error (1) will also increase from .01 to .05 (2) will not change (3) will decrease (4) Not enough information is given to answer this question. (5) none of the above.
10. The probability density function for a uniform distribution ranging between 2 and 6 is (1) 4 (2) 0.25 (3) any positive value (4) undefined (5) none of the above.
11. A continuous probability that is useful in describing the time, or space, between occurrences of an event is a(n) (1) normal probability distribution (2) uniform probability distribution (3) exponential probability distribution (4) Poisson probability distribution (5) none of the above.
12. Consider a binomial probability experiment with $n=100$ and $p=0.20$. Because of the computational problem associated with the large n , it is best to approximate the binomial distribution by using the (1) normal distribution (2) Poisson distribution (3) uniform distribution (4) none of the distributions are appropriate (5) none of the above.
13. The life expectancy of a particular brand of tire is normally distributed with a mean of 40,000 and a standard deviation of 5,000 miles. What is the probability that a randomly selected tire will have a life of exactly 47,500 miles? (1) 0.4332 (2) 0.9332 (3) 0.0668 (4) 0.4993 (5) zero.
14. If we are interested in testing whether the mean of population 1 is smaller than the mean of population 2, the (1) null hypothesis should state $\mu_1 - \mu_2 < 0$ (2) null hypothesis should state $\mu_1 - \mu_2 > 0$ (3) alternative hypothesis should state $\mu_1 - \mu_2 \geq 0$ (4) alternative hypothesis should state $\mu_1 - \mu_2 \leq 0$ (5) none of the above.
15. Independent simple random samples are taken to test the difference between the means of two populations. The sample sizes are $n_1 = 25$ and $n_2 = 35$. It is assumed that the variances of the populations are equal and that the populations are normally distributed. The sampling distribution of $(\bar{x}_1 - \bar{x}_2)$ is the (1) normal distribution (2) t distribution with 60 degrees of freedom (3) t distribution with 58 degrees of freedom (4) Not enough information given. (5) none of the above.
16. The sampling distribution used when making inferences about a single population's variance is (1) an F distribution (2) a t distribution (3) a chi-square distribution (4) a normal distribution (5) none of the above.
17. The random variable for a chi-square distribution may assume (1) any value between -1 to 1 (2) any value between -infinity to +infinity (3) any negative value (4) any value greater than zero (5) none of the above.

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18. Which of the following is an example of nonprobabilistic sampling? (1) simple random sampling (2) stratified simple random sampling (3) cluster sampling (4) judgment sampling (5) none of the above.
19. As the sample size increases, the (1) standard deviation of the population decreases (2) population mean increases (3) standard error of the mean decreases (4) standard error of the mean increases (5) none of the above.
20. The probability distribution of the sample mean is called the (1) central probability distribution (2) sampling distribution of the mean (3) random variation (4) standard error (5) none of the above.
21. The sampling distribution of the ratio of two independent sample variances taken from normal populations with equal variances is (1) an F distribution (2) a t distribution (3) a chi-square distribution (4) a normal distribution (5) none of the above.
22. A point estimator will be unbiased if the (1) expected value of the point estimator equals the value of the population parameter (2) sample size is greater than 30 or $np \geq 5$ and $n(1-p) \geq 5$ (3) sampling distribution is normally distributed (4) value of the population parameter is known (5) none of the above.
23. Doubling the size of the sample will (1) reduce the standard error of the mean to one-half its current value (2) reduce the standard error of the mean to approximately 70% of its current value (3) have no effect on the standard error of the mean (4) double the standard error of the mean (5) none of the above.
24. The following data was collected from a simple random sample of a population : 13, 15, 14, 16, 12. If the population consisted of 10 elements, how many different random samples of size 6 could be drawn from the population? (1) 60 (2) 210 (3) 3024 (4) 362880 (5) none of the above.
25. The absolute value of the difference between the point estimate and the population parameter it estimates is the (1) standard error (2) sampling error (3) precision (4) error of confidence (5) none of the above.
26. As the number of degrees of freedom for a t distribution increases, the difference between the t distribution and the standard normal distribution (1) becomes larger (2) becomes smaller (3) stays the same (4) none of the above.
27. Whenever the population standard deviation is unknown and the population has a normal or near-normal distribution, which distribution is used in developing an interval estimation? (1) standard distribution (2) z distribution (3) beta distribution (4) t distribution (5) none of the above.
28. If we change a 95% confidence interval estimate to a 99% confidence interval estimate, we can expect (1) the size of the confidence interval to increase (2) the size of the confidence interval to decrease (3) the size of the confidence interval to remain the same (4) the sample size to increase (5) none of the above.
29. Which of the following best describes the form of the sampling distribution of the sample proportion? (1) When standardized, it is exactly the standard normal distribution. (2) When standardized, it is the distribution. (3) It is approximately normal as long as $n \geq 30$. (4) It is approximately normal as long as $np \geq 5$ and $n(n-p) \geq 5$. (5) none of the above.
30. A continuous probability that is useful in describing the time, or space, between occurrences of an event is a(n) (1) normal probability distribution (2) uniform probability distribution (3) exponential probability distribution (4) Poisson probability distribution (5) none of the above.
31. A normal distribution is a distribution (1) with a mean of 1 and a standard deviation of 0 (2) with a mean of 0 and a standard deviation of 1 (3) with any mean and a standard deviation of 1 (4) with any mean and any standard deviation (5) none of the above.
32. The life expectancy of a particular brand of tire is normally distributed with a mean of 40,000 and a standard deviation of 5,000 miles. What is the probability that a randomly selected tire will have a life of exactly 47,500 miles? (1) 0.4332 (2) 0.9332 (3) 0.0668 (4) 0.4993 (5) zero.
33. Events A and B are mutually exclusive. Which of the following statements is also true?
 (1) A and B are also independent (2) $P(A \cup B) = P(A)P(B)$ (3) $P(A \cup B) = P(A) + P(B)$
 (4) $P(A \cap B) = P(A) + P(B)$ (5) none of the above.

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II. Multiple Choice Questions:

1. The following random sample was collected : 9, 7, 6, 10. The 95% confidence interval for μ is (1) 2.19 to 15.80 (2) 5.09 to 10.90 (3) 5.27 to 8.72 (4) 5.23 to 8.76 (5) none of the above. (2%)
2. A population has a mean of 80 and a standard deviation of 7. A sample of 49 observations will be taken. The probability that the sample mean will be larger than 82 is (1) 0.5228 (2) 0.9772 (3) 0.4772 (4) 0.0228 (5) none of the above. (2%)
3. $n=49$ $\bar{x}=54.8$ $S=28$ $H_0: \mu=50$ $H_1: \mu \neq 50$ If the test is done at the 5% level of significance, the null hypothesis should (1) not be rejected (2) be rejected (3) Not enough information given to answer this question. (4) none of the above. (2%)
4. In a random sample of 100 observations, $\bar{p}=0.2$. The 95.44% confidence interval for P is (1) 0.122 to 0.278 (2) 0.164 to 0.236 (3) 0.134 to 0.266 (4) 0.120 to 0.280 (5) none of the above. (2%)
5. It is known that the population variance equals 484. With a 0.95 probability, the sample size that needs to be taken if the desired margin of error is 3.92 or less is (1) 11 (2) 22 (3) 121 (4) 484 (5) 58564. (2%)
6. 假設全台灣有四大族群，五個政黨傾向。欲證明四大族群在政黨傾向上並無差異，某報民調進行問卷調查，並作交叉分析，得到一交叉分析表 (Contingency Table)。若欲進一步推論該交叉分析表，需作何種檢定 (1) F-檢定 (2) t-檢定 (3) z-檢定 (4) χ^2 -檢定 (1%)
7. 上述檢定之自由度為：(1) 4, 5 (2) 3, 4 (3) 20 (4) 12 (5) 無自由度可言 (1%)
8. (繼上題) 欲判斷四大族群平均收入是否有差異，該用何種統計檢定法 (1) One-way ANOVA (2) One-way MANOVA (3) Two-way ANOVA (4) Two-way MANOVA (5) ANCOVA (1%)
9. (繼上題) 欲證明族群(四大族群)，政黨傾向(五個政黨傾向)，在對政府績效評分上(0-100分)，沒有交互作用，該用何種統計檢定法 (1) One-way ANOVA (2) One-way MANOVA (3) Two-way ANOVA (4) Two-way MANOVA (5) ANCOVA (1%)
10. 上述統計檢定法，需作何種檢定(1) F-檢定 (2) t-檢定 (3) z-檢定 (4) χ^2 -檢定 (1%)
11. (繼上題) 若某報民調總共訪問 100 個樣本，則上述檢定自由度為 (1) 4, 5 (2) 20 (3) 12, 80 (4) 20, 79 (5) 12 (1%)
12. 今有 10 種不同車款新車上市，有兩家雜誌分別給這 10 種車款排名。問可用何統計數字，檢定兩家雜誌的 10 種車款排名，是否一致 (1) 皮耳森相關係數 (Pearson correlation coefficient) (2) 卡方值 (χ^2 -值) (3) Durbin-Watson d statistics (4) Spearman rank correlation coefficient (1%)
13. 兩變數 X, Y 間相關係數 ρ ，與判定係數 R^2 關係為何? (1) $\rho=R^2$ (2) $\rho^2=R^2$ (3) $\rho=-R^2$ (4) $\rho < R^2$ (1%)
14. 假設有兩個迴歸模型，分別為： $Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\epsilon$ $Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+\epsilon$ 欲檢定 $H_0: \beta_6=\beta_7=\beta_8=0$ ，抽取 50 個樣本，需作何種檢定 (1) F-檢定 (2) t-檢定 (3) z-檢定 (4) χ^2 -檢定 (5) Scheffe test (1%)
15. 上述檢定之自由度為：(1) 5, 8 (2) 3, 41 (3) 3, 44 (4) 40 (5) 無自由度可言 (1%)

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III. 簡答題

一. 假設有一迴歸模型： $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$ ，欲驗證模型合適性，於是抽取 25 個樣本。假設根據資料得 ANOVA 表如下：

Source	SS	df	MS	F	p-value
Regression	1029.33	5	205.87	18.6645	9.63E-7
Error	209.50	19	11.03		
Total	1238.83	24			

- 就以上模型，解釋何謂線性重合（或共線性）？(3%) 該如何解決？(3%)
- Least squares estimation 在什麼情況下使用？(2%) 又 Weighted least squares estimation 在何時使用？(2%)
- 何謂殘差(Residual)？(3%) 欲判斷模型合適性，該如何檢定殘差？(3%)
- 根據以上 ANOVA 表，試問可以做出何種結論？(3%)
- 若以上迴歸模型中，依變數 Y 為類別變數（可能值為 0, 1），該如何處理？(3%) 又若自變數 X_1 為類別變數時（可能值為 0, 1, 2），該如何處理？(3%)

二. 欲研究在台灣不同居住地理位置(四種地理位置:北, 中, 南, 東)和性別(男, 女), 對某種手機款式喜好的差別。研究者分別就四種不同地理位置, 男女各抽樣四名, 進行對該手機款式喜好的評分。統計分析得到如下結果, 請填滿空格 (14%)。設 $\alpha = .10$, 試對下面結果作出分析與結論。(8%):

Analysis of Variance Procedure

Source	df	SS	MS	F	Pr>F
Model	7	33659.8	4808.5	_____	0.0001
Error	_____	_____	_____		
Corrected Total	31	34482.0			

Source	df	SS	MS	F	Pr>F
地理位置	_____	800.7	_____	_____	0.0008
性別	_____	32093.1	_____	_____	0.0001
地理位置*性別	_____	_____	_____	_____	0.059