

國立臺北商業技術學院 103 學年度研究所碩士班考試入學試題

准考證號碼：□□□□□□ (請考生自行填寫)

商研所.財金財務管理組.資研所 筆試科目：統計學 共 6 頁，第 1 頁

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| 注意事項 | 1. 本科目合計 100 分，答錯不倒扣。
2. 請於答案卷上依序作答，並標註清楚題號 (含小題)。
3. 考完請將答案卷及試題一併繳回。 |
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參考資料：(常態分配表於測驗卷最後一頁)

$$t_{0.05}(11)=1.796, \text{ 即 } T \sim t(11), P(T > 1.796)=0.05$$

$$t_{0.025}(11)=2.201, \text{ 即 } T \sim t(11), P(T > 2.201)=0.025$$

$$t_{0.025}(22)=2.074, \text{ 即 } T \sim t(22), P(T > 2.074)=0.025$$

$$f_{0.05}(4,13)=3.18, \text{ 即 } F \sim F(4,13), P(F > 3.18)=0.05$$

$$f_{0.05}(5,13)=3.03, \text{ 即 } F \sim F(5,13), P(F > 3.03)=0.05$$

$$f_{0.05}(4,17)=2.96, \text{ 即 } F \sim F(4,17), P(F > 2.96)=0.05$$

$$f_{0.05}(5,17)=2.81, \text{ 即 } F \sim F(5,17), P(F > 2.81)=0.05$$

$$X^2_{0.05}(3)=7.815, \text{ 即 } X^2 \sim X^2(3), P(X^2 > 7.815)=0.05(\text{卡方分配})$$

$$X^2_{0.025}(3)=9.348, \text{ 即 } X^2 \sim X^2(3), P(X^2 > 9.348)=0.025(\text{卡方分配})$$

$$X^2_{0.05}(4)=9.488, \text{ 即 } X^2 \sim X^2(4), P(X^2 > 9.488)=0.05(\text{卡方分配})$$

$$X^2_{0.025}(4)=11.143, \text{ 即 } X^2 \sim X^2(4), P(X^2 > 11.143)=0.025(\text{卡方分配})$$

一、單選題(每題 4 分，計 80 分)

1. If the time required to complete a task is uniformly distributed between 20 and 110 seconds what proportion of tasks will be completed in less than 50 seconds?
(A) More than 0.20 but not more than 0.30
(B) More than 0.30 but not more than 0.40
(C) More than 0.40 but not more than 0.50
(D) More than 0.50 but not more than 0.60
(E) More than 0.60
2. The "no-show" rate at a popular resort hotel is 8.5%. If a random sample of 120 reservations is taken, what is the probability that the number of "no shows" will exceed 15?
(A) 0.0049 (B) 0.0582 (C) 0.4418 (D) 0.4951 (E) 0.9418
3. If we want to construct a confidence interval half as wide as the current one, then the sample needs to be:
(A) Twice as large
(B) Half as large
(C) One-fourth as large
(D) Four times as large
(E) Eight times as large

背面尚有試題

4. The management of a local restaurant wants to estimate the average amount their customers spend at the restaurant to within \$0.6, with a 95% confidence. What is the minimum sample size required, if the standard deviation is assumed to be \$4.5?
(A) 217 (B) 189 (C) 325 (D) 196 (E) None of the above
5. An advertiser is believed to exaggerate claims about a company's product, (high performance, larger measurable average). An agency wants to prove that this advertiser's claims are exaggerated. There are data available. The correct hypothesis test will be:
(A) Two-tailed test (B) Right-hand tailed test
(C) Left-hand tailed test (D) None of the above
6. The proportion of defective items is not allowed to be over 12%. A buyer wants to test whether the proportion of defectives exceeds the allowable limit. The buyer takes a random sample of 120 items and finds that 18 are defective. Find the p-value.
(A) 0.1562 (B) 0.3212 (C) 0.3438 (D) 0.1788 (E) None of the above
7. In a two-tailed hypothesis test involving a normally distributed population parameter with a known standard deviation, the computed test statistic was $Z = 1.83$. If the null hypothesis is rejected based on this evidence, the risk of making a _____ error is approximately _____.
(A) Type II; 3.4 % (B) Type I; 3.4% (C) Type II; 6.7%
(D) Type I; 6.7% (E) None of the above
8. Calculate the pooled variance for the following sample data.
- | Sample mean | Sample Variance | Sample Size |
|-------------|-----------------|-------------|
| 40 | 9 | 15 |
| 30 | 14 | 20 |
- (A) 11.88 (B) 12.20 (C) 12.58 (D) 13.24 (E) None of the above
9. Using two independent samples, two population means are compared to determine if a difference exists. The number in the first sample is 25 and the number in the second sample is 18. How many degrees of freedom are associated with the critical t-value?
(A) 17 (B) 24 (C) 41 (D) 42 (E) None of the above
10. An unbiased estimator of σ^2 is?
(A) SSE (B) MSE (C) $S(b_0)$ (D) S (E) $S(b_1)$

11. Suppose that you are sampling from a normal distribution with standard deviation 7. The population mean is assumed to be a random variable with mean 18 and standard deviation 4. A sample of size 200 gives a sample mean of 12. The posterior normal distribution of the population mean has a mean equal to:
(A) 12.01 (B) 12.09 (C) 17.91 (D) 18.09 (E) None of the above
12. The coefficient of determination, R^2 , has which one of the following properties?
(A) Is always negative
(B) Applies to any relationship between x and y
(C) Is a ratio of unexplained variation to explained variation
(D) Has the same sign as the slope of the regression line
(E) Ranges from zero to one
13. When testing $H_0: \beta_1 = 0$, against $H_1: \beta_1 \neq 0$, failing to reject the null hypothesis means what?
(A) The slope of the regression line is not zero
(B) There is evidence of a relationship between x and y, but it is not linear
(C) The relationship between x and y is an inverse one
(D) There is not a linear relationship between x and y
(E) There is a linear relationship between x and y
14. Analysis of variance is a statistical method of comparing the _____ of several populations.
(A) Standard deviations (B) Variances (C) Means
(D) Proportions (E) None of the above
- 15 The chi-square technique of hypothesis testing can be used ?
(A) To conduct goodness-of fit tests.
(B) To test the alleged independence of two qualitative population variables.
(C) To make inferences about population variance
(D) For all of the above purposes(and more).
(E) A and B of the above answers are correct.
- 16 In the simple linear regression model $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$, the parameters are ?
(A) The term β_0, β_1 and the sample size n.
(B) The variance of the error term σ^2 and the sample size n.
(C) The terms β_0, β_1 and σ^2 .
(D) There are no parameters in this model.
(E) None of the above.

Use the following to answer questions 17-18:

A set of 25 observations of two variables x and y produced the following summations: $\sum x = 62, \sum y = 120, \sum xy = 114, \sum x^2 = 310, \sum y^2 = 950$.

A simple linear regression of y on x is fitted.

17. What is the estimated coefficient of x ?

- (A) -1.89 (B) -1.18 (C) -0.96 (D) 1.26 (E) None of the above

18. The y intercept is ?

- (A) 1.68 (B) 7.18 (C) 7.73 (D) 9.49 (E) None of the above

Use the following to answer questions 19-20:

The rate of consumption of disposable tooling is a significant cost driver at a small manufacturing firm which employs 12 workers. Recently, on a trial basis the firm switched suppliers of its tooling and observed the following changes in rates of consumption across its employees:

Employee	Monthly Consumption	
	Old	New
Charles	72	59
Caroline	59	57
Emma	44	37
Andrew	51	51
Roy	91	66
Colleen	73	63
Edgar	55	60
Gregory	80	72
Janet	72	67
Brenda	57	48
Susan	62	53
Michael	65	67

The firm will permanently switch suppliers only if it has substantial evidence ($\alpha = 0.05$) that consumption is *lower* under the new supplier.

19. What is an appropriate decision rule to use for hypothesis testing in this situation?

- (A) Reject H_0 if the observed t is less than -1.796
 (B) Reject H_0 if the absolute value of the observed t is greater than 2.074
 (C) Reject H_0 if the observed t is less than -2.201
 (D) Reject H_0 if the absolute value of the observed z is greater than 1.96
 (E) Reject H_0 if the absolute value of the observed z is less than -1.645

20. Compute the test statistic for this test ?

- (A) -2.97 (B) -1.42 (C) -0.38 (D) -0.96 (E) -1.37

二、計算題(計 20 分)

1. In order to test whether Lee's productivity is the same on the 5 weekdays of a week, unknown to Lee, his employer kept records on 18 randomly picked days, as the data in table 1 shows. (10%)

Monday	Tuesday	Wednesday	Thursday	Friday
141	150	165	135	114
130	156	134	165	127
110	146	175	126	134
	148	160		
		136		

(Productivity is measured in terms of market value, in dollars, of items produced by Lee.) (1) Carry out the test using $\alpha=0.05$ (2) What is your conclusion ?

ANOVA table				
Source of variation	Sum of square	Degree of freedom	Mean sum of square	Computed ratio
Between				
Within				
Total				

2. A random sample of 395 people were classified by their age and by whether or not they change channels during programs when watching television. Use the following data to test the null hypothesis : (10%)

H_0 : Changing channels and age are independent attributes. ($\alpha=0.05$)

Change?	18-24	25-34	35-49	50-64
Yes	56	52	28	72
No	58	60	32	42

試題結束

