

國立臺北商業大學 105 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)

財務金融系碩士班

財政稅務系碩士班

國際商務系碩士班

企業管理系碩士班

筆試科目：統計學

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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。

A. Multiple Choice (60%)

1. What is a portion or part of a population called?
A) Random survey B) Sample C) Tally D) Frequency distribution
2. What level of measurement are the Centigrade and Fahrenheit temperature scales?
A) Nominal B) Ordinal C) Interval D) Ratio
3. The general process of gathering, organizing, summarizing, analyzing, and interpreting data is called
A) Statistics. B) Descriptive statistics. C) Inferential statistics.
D) Levels of measurement.
4. A small sample of computer operators shows monthly incomes of \$1,950, \$1,775, \$2,060, \$1,840, \$1,795, \$1,890, \$1,925 and \$1,810. What are these ungrouped numbers called?
A) Histogram B) Class limits C) Class frequencies D) Raw data
5. When data is collected using a qualitative, nominal variable, i.e., male or female, what is true about a frequency distribution that summarizes the data?
A) Upper and lower class limits must be calculated.
B) Class midpoints can be computed.
C) Number of classes corresponds to number of the variable's values.
D) The "2 to the k rule" can be applied.
6. A group of 100 students were surveyed about their interest in a new International Studies program. Interest was measured in terms of high, medium, or low. 30 students responded high interest; 50 students responded medium interest; 40 students responded low interest. What is the relative frequency of students with high interest?
A) 30% B) 50% C) 40% D) Cannot be determined.

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7. Which measures of central location are not affected by extremely small or extremely large values?
- A) Mean and median B) Mean and mode C) Mode and median
D) Geometric mean and mean

8. A sample of the daily production of transceivers was organized into the following distribution.

Daily Production	Frequencies
80 up to 90	5
90 up to 100	9
100 up to 110	20
110 up to 120	8
120 up to 130	6
130 up to 140	2

What is the mean daily production?

- A) 106.4 B) 101.4 C) 111.4 D) 105.0

9. A sample of single persons receiving social security payments revealed these monthly benefits: \$826, \$699, \$1,087, \$880, \$839 and \$965. How many observations are below the median?

- A) 0 B) 1 C) 2 D) 3

10. What is the relationship between the variance and the standard deviation?

- A) Variance is the square root of the standard deviation
B) Variance is the square of the standard deviation
C) Variance is twice the standard deviation
D) No constant relationship between the variance and the standard deviation

11. What is the possible range of values for the coefficient of variation?

- A) -1 and +1 B) -3 and +3 C) 0% and 100% D) Unlimited values

12. In a scatter diagram, we describe the relationship between

- A) two variables measured at the ordinal level
B) two variables, one measured as an ordinal variable and the other as a ratio variable
C) two variables measured at the interval or ratio level
D) a variable measure on the interval or ratio level and time.

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13. What statistics are needed to draw a box plot?
- A) Minimum, maximum, median, first and third quartiles
B) Median, mean and standard deviation
C) A median and an interquartile range
D) A mean and a standard deviation.
14. In a contingency table, we describe the relationship between
- A) two variables measured at the ordinal or nominal level.
B) two variables, one measured as an ordinal variable and the other as a ratio variable
C) two variables measured at the interval or ratio level
D) a variable measure on the interval or ratio level and time.
15. A study of 200 computer service firms revealed these incomes after taxes:
- | Income After Taxes | Number of Firms |
|--------------------------------|-----------------|
| Under \$1 million | 102 |
| \$1 million up to \$20 million | 61 |
| \$20 million and more | 37 |
- What is the probability that a particular firm selected has \$1 million or more in income after taxes?
- A) 0.00 B) 0.25 C) 0.49 D) 0.51
16. A study by the National Park Service revealed that 50% of the vacationers going to the Rocky Mountain region visit Yellowstone Park, 40% visit the Grand Tetons and 35% visit both. What is the probability that a vacationer will visit at least one of these magnificent attractions?
- A) 0.95 B) 0.35 C) 0.55 D) 0.05
17. Which is true for a binomial distribution?
- A) There are three or more possible outcomes
B) Probability of success remains the same from trial to trial
C) Value of p is equal to 1.50
D) All of the above are correct

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18. Which shape describes a Poisson distribution?
A) Positively skewed B) Negatively skewed C) Symmetrical D) All of the above
19. Which of the following is NOT true regarding the normal distribution?
A) Mean, median and mode are all equal
B) It has a single peak
C) It is symmetrical
D) The points of the curve meet the X-axis at $z = -3$ and $z = 3$
20. What is the difference between a sample mean and the population mean called?
A) Standard error of the mean B) Sampling error C) Interval estimate D) Point estimate
21. As the size of the sample increases, what happens to the shape of the sampling means?
A) Cannot be predicted in advance B) Approaches a normal distribution
C) Positively skewed D) Negatively skewed
22. Sampling error is the difference between a corresponding sample statistic and the
A) sample mean. B) biased sample. C) population parameter. D) chance error.
23. When a confidence interval for a population mean is constructed from sample data,
A) we can conclude that the population mean is in the interval
B) we can conclude that the population mean is not in the interval
C) we can conclude, with a stated level of confidence, that the population mean is in the interval
D) we cannot make any inferences.
24. The distribution of Student's t has
A) a mean of zero and a standard deviation of one
B) a mean of one and a standard deviation of one
C) a mean of zero and a standard deviation that depends on the sample size
D) a mean that depends on the sample size and a standard deviation of one

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25. What is the level of significance?
- A) Probability of a Type II error B) Probability of a Type I error
C) z-value of 1.96 D) Beta error
26. What value does the null hypothesis make a claim about?
- A) Population parameter B) Sample statistic
C) Sample mean D) Type II error
27. A p-value can be computed for
- A) a hypothesis test about a population mean
B) a hypothesis test about a population proportion.
C) a hypothesis test about a population mean based on a sample size of 10.
D) A, B, and C
28. Analysis of variance is used to
- A) compare nominal data. B) compute t test.
C) compare population proportion. D) simultaneously compare several population means.
29. A large department store examined a sample of the 18 credit card sales and recorded the amounts charged for each of three types of credit cards: MasterCard, Visa and Discover. Six MasterCard sales, seven Visa and five Discover sales were recorded. The store used ANOVA to test if the mean sales for each credit card were equal. What are the degrees of freedom for the F statistic?
- A) 18 in the numerator, 3 in the denominator B) 3 in the numerator, 18 in the denominator
C) 2 in the numerator, 15 in the denominator D) 6 in the numerator, 15 in the denominator
30. Based on the regression equation, we can
- A) predict the value of the dependent variable given a value of the independent variable.
B) predict the value of the independent variable given a value of the dependent variable.
C) measure the association between two variables.
D) all of the above.

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B、作答題 (40%)

一、某大學商務系一年級學生共 120 人，分成男、女兩組，男生 80 人，平均身高為 172 公分，標準差為 7 公分；女生 40 人，平均身高為 164 公分，標準差為 6 公分。試問：

- ① 男生或女生的身高較一致？(2%)
- ② 求全班之平均身高及標準差。(4%)

二、雖然時代在進步，但「重男輕女」的觀念卻沒有多大改變。下列資料為一小規模的調查結果：

性別	樣本數	平均月薪	標準差
男	196	49,931	5,200
女	196	40,673	7,200

資料來源：《受僱員工薪資調查統計》，行政院主計處，2014 年 12 月。

若男、女性的母體變異數不等，在顯著水準為 5% 時，檢定男性平均月薪是否高於女性 5,000 元以上？(14%)

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三、下表為利用 22 個樣本對迴歸模型 $Y = \alpha + \beta X + \gamma Z + \varepsilon$ 之 Excel 估計結果：

迴歸統計	
R 的倍數	0.694921
R 平方	0.482916
調整的 R 平方	0.431207
標準誤	6.505848
觀察值個數	23

ANOVA

	自由度	SS	MS	F	顯著值
迴歸	(a)	(c)	395.2919	(f)	0.0014
殘差	(b)	(d)	(e)		
總和	22	1637.1051			

	係數	標準誤	t 統計	P-值	下限 95%	上限 95%
截距	82.94013	29.83105	2.78033	0.01155	20.71368	145.16658
X	-1.99674	1.15013	-1.73610	0.09793	-4.39586	0.40239
Z	0.00035	0.00009	3.85382	0.00099	0.00016	0.00054

試回答下列問題：

- ①請計算完成 ANOVA 表中(a)至(f)之內容。(12%)
- ②試問 α 、 β 和 γ 的樣本估計值為何？(3%)
- ③迴歸方程式 $Y = \alpha + \beta X + \gamma Z + \varepsilon$ 的估計式為何？(1%)
- ④分別檢定 α 是否為 0 ($\alpha = 0.05$)？ β 是否小於 0 ($\alpha = 0.05$)？ γ 是否大於 0 ($\alpha = 0.05$)？(3%)
- ⑤建立 γ 的 95% 信賴區間。(1%)