

國立中山大學100學年度碩士班招生考試試題

科目：商用統計學丙【企管系甲班碩士班丙組選考】

(一) 單選題 (共 25 題，每題 2 分，合計 50 分)

1. Quantitative data refers to data obtained with a(n)
 - a. ordinal scale
 - b. nominal scale
 - c. either interval or ratio scale
 - d. only interval scale
2. Statistical inference
 - a. refers to the process of drawing inferences about the sample based on the characteristics of the population
 - b. is the same as descriptive statistics
 - c. is the process of drawing inferences about the population based on the information taken from the sample
 - d. is the same as a census
3. A statistics professor asked students in a class their ages. On the basis of this information, the professor states that the average age of all the students in the university is 24 years. This is an example of
 - a. a census
 - b. descriptive statistics
 - c. an experiment
 - d. statistical inference
4. A tabular method that can be used to summarize the data on two variables simultaneously is called
 - a. simultaneous equations
 - b. crosstabulation
 - c. a histogram
 - d. an ogive
5. In a scatter diagram, a line that provides an approximation of the relationship between the variables is known as
 - a. approximation line
 - b. trend line
 - c. line of zero intercept
 - d. line of zero slope
6. In a cumulative percent frequency distribution, the last class will have a cumulative percent frequency equal to
 - a. one
 - b. 100
 - c. the total number of elements in the data set
 - d. none of the above
7. Since population size is always larger than sample size, then the sample statistic
 - a. can never be larger than the population parameter
 - b. can never be equal to the population parameter
 - c. can be smaller, larger, or equal to the population parameter
 - d. can never be smaller than the population parameter
8. The weights (in pounds) of a sample of 36 individuals were recorded and the following statistics were calculated.
mean = 160 range = 60

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mode = 165 variance = 324

median = 170

The coefficient of variation equals

- a. 0.1125%
 - b. 11.25%
 - c. 203.12%
 - d. 0.20312%
9. If a six sided die is tossed two times and "3" shows up both times, the probability of "3" on the third trial is
- a. much larger than any other outcome
 - b. much smaller than any other outcome
 - c. $1/6$
 - d. $1/216$
10. If A and B are independent events with $P(A) = 0.4$ and $P(B) = 0.6$, then $P(A \cap B) =$
- a. 0.76
 - b. 1.00
 - c. 0.24
 - d. 0.20
11. Which of the following is a required condition for a discrete probability function?
- a. $\sum f(x) = 0$
 - b. $f(x) \geq 1$ for all values of x
 - c. $f(x) < 0$
 - d. $\sum f(x) = 1$
12. A continuous random variable may assume
- a. any value in an interval or collection of intervals
 - b. only integer values in an interval or collection of intervals
 - c. only fractional values in an interval or collection of intervals
 - d. only the positive integer values in an interval
13. For any continuous random variable, the probability that the random variable takes on exactly a specific value is
- a. 1.00
 - b. 0.50
 - c. any value between 0 to 1
 - d. almost zero
14. Which of the following is not a characteristic of the normal probability distribution?
- a. The mean, median, and the mode are equal
 - b. The mean of the distribution can be negative, zero, or positive
 - c. The distribution is symmetrical
 - d. The standard deviation must be 1
15. Consider a binomial probability experiment with $n = 3$ and $p = 0.1$. Then, the probability of $x = 0$ is
- a. 0.0000
 - b. 0.0001

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- c. 0.001
 - d. 0.729
16. A population consists of 500 elements. We want to draw a simple random sample of 50 elements from this population. On the first selection, the probability of an element being selected is
- a. 0.100
 - b. 0.010
 - c. 0.001
 - d. 0.002
17. As the sample size increases, the
- a. standard deviation of the population decreases
 - b. population mean increases
 - c. standard error of the mean decreases
 - d. standard error of the mean increases
18. From a population with a variance of 900, a sample of 225 items is selected. At 95% confidence, the margin of error is
- a. 15
 - b. 2
 - c. 3.92
 - d. 4
19. An estimate of a population parameter that provides an interval of values believed to contain the value of the parameter is known as the
- a. confidence level
 - b. interval estimate
 - c. parameter value
 - d. population estimate
20. The level of significance is the
- a. maximum allowable probability of Type II error
 - b. maximum allowable probability of Type I error
 - c. same as the confidence coefficient
 - d. same as the p -value
21. Your investment executive claims that the average yearly rate of return on the stocks she recommends is more than 10.0%. You plan on taking a sample to test her claim. The correct set of hypotheses is
- a. $H_0: \mu < 10.0\%$ $H_a: \mu \geq 10.0\%$
 - b. $H_0: \mu \leq 10.0\%$ $H_a: \mu > 10.0\%$
 - c. $H_0: \mu > 10.0\%$ $H_a: \mu \leq 10.0\%$
 - d. $H_0: \mu \geq 10.0\%$ $H_a: \mu < 10.0\%$
22. For a two-tailed test at 86.12% confidence, $Z =$
- a. 1.96
 - b. 1.48
 - c. 1.09
 - d. 0.86
23. When developing an interval estimate for the difference between two sample means, with sample sizes of n_1 and n_2 ,
- a. n_1 must be equal to n_2

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- b. n_1 must be smaller than n_2
 c. n_1 must be larger than n_2
 d. n_1 and n_2 can be of different sizes,
24. Independent simple random samples are taken to test the difference between the means of two populations whose standard deviations are not known. The sample sizes are $n_1 = 25$ and $n_2 = 35$. The correct distribution to use is the
- a. Poisson distribution
 b. t distribution with 60 degrees of freedom
 c. t distribution with 59 degrees of freedom
 d. t distribution with 58 degrees of freedom
25. The sampling distribution of $\bar{p}_1 - \bar{p}_2$ is approximated by a
- a. normal distribution
 b. t -distribution with $n_1 + n_2$ degrees of freedom
 c. t -distribution with $n_1 + n_2 - 1$ degrees of freedom
 d. t -distribution with $n_1 + n_2 + 2$ degrees of freedom

(二) 問答題 (共 3 道題, 合計 50 分)

- (1) Consider the following data for two variables
- x
- and
- y
- .

x	y
1	1
4	6
7	9
8	7
9	4
10	3

- a. An estimated regression equation of the form $\hat{y} = b_0 + b_1x$ was developed for the above data and the results are shown below. Comment on the adequacy of this equation for predicting y . Let $\alpha = 0.05$. (10分)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.3052
R Square	0.0932
Adjusted R Square	-0.1335
Standard Error	3.0857
Observations	6

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.9130	3.9130	0.4110	0.5564
Residual	4	38.0870	9.5217		
Total	5	42			

	Coefficients	Standard Error	t Stat	P -value
Intercept	3.3043	2.9297	1.1279	0.3224
X	0.2609	0.4069	0.6411	0.5564

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- b. Now, another regression equation of the form $\hat{y} = b_0 + b_1x + b_2x^2$ was developed for the above data and results are shown below. Comment on the adequacy of this equation for predicting y . Let $\alpha = 0.05$ (10分)

SUMMARY
OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.9508
R Square	0.9041
Adjusted R Square	0.8401
Standard Error	1.1588
Observations	6

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	37.9713	18.9856	14.1376	0.0297
Residual	3	4.0287	1.343		
Total	5	42			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-2.6808	1.6196	-1.655	0.1964
x	3.6803	0.6960	5.2879	0.0132
x-squared	-0.3133	0.0622	-5.036	0.0151

- (2) Brakes Shop, Inc., is a franchise that specializes in repairing brake systems of automobiles. The company purchases brake shoes from a national supplier. Currently, lots of 1,000 brake shoes are purchased, and each shoe is inspected before being installed on an automobile. The company has decided instead of 100% inspection to adopt an acceptance sampling plan.
- Explain what is meant by the acceptance sampling plan. If the company decides to adopt an acceptance sampling plan, what kinds of risks are there? (10分)
 - The quality control department of the company has decided to select a sample of 10 shoes and inspect them for defects. Furthermore, it has been decided that if the sample contains no defective parts, the entire lot will be accepted. If there are 50 defective shoes in a shipment, what is the probability that the entire lot will be accepted? (5分)

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- (3) It is believed that sales of books at a local bookstore follow a Poisson distribution. Below you are given information on the number of books sold during a sample of 15-minute intervals.

Number of Books	Frequency
0	2
1	3
2	12
3	16
4	19
5	20
6	18
7	16
8	9
9	<u>5</u>
	120

- a. State the null and alternative hypotheses. (5分)
- b. Compute the test statistic and draw conclusion of the test with $\alpha = 0.05$, given that $\chi^2_{7;0.05} = 14.067$ (10分)