國立中山大學101學年度碩士暨碩士專班招生考試試題

科目：商用統計學丙〔企管系甲班碩士班丙組選考〕

本份試題共有50題選擇題，每題2分，計100分。

單選題

(1) A histogram is
a. a graphical presentation of a frequency or relative frequency distribution
b. a graphical method of presenting a cumulative frequency or a cumulative relative frequency distribution
c. the history of data elements
d. the same as a pie chart

(2) 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 these alternatives is correct.

(3) The sum of deviations of the individual data elements from their mean is
a. always greater than zero
b. always less than zero
c. sometimes greater than and sometimes less than zero, depending on the data elements
d. always equal to zero

(4) The numerical value of the variance
a. is always larger than the numerical value of the standard deviation
b. is always smaller than the numerical value of the standard deviation
c. is negative if the mean is negative
d. can be larger or smaller than the numerical value of the standard deviation

(5) The variance of a sample was reported to be 144. The report indicated that $\sum\left(x-\bar{x}\right)^2=$ 7200. What has been the sample size?
a. 49
b. 50
c. 51
d. 52

(6) If P(A) = 0.45, P(B) = 0.55, and P(A ∪ B) = 0.78, then P(A | B) =
a. zero
b. 0.45
c. 0.22
d. 0.40

(7) The number of electrical outages in a city varies from day to day. Assume that the number of electrical outages (x) in the city has the following probability distribution.

X	f(x)
0	0.80
1	0.15
2	0.04
3	0.01

The mean and the standard deviation for the number of electrical outages (respectively) are

a. 0.26 and 5.77
b. 0.26 and 0.577
c. 0.26 and 0.01
d. 0 and 0.8

(8) Twenty percent of the students in a class of 100 are planning to go to graduate school. The standard deviation of this binomial distribution is

a. 20
b. 16
c. 4
d. 2

(9) A production process produces 2% defective parts. A sample of five parts from the production process is selected. What is the probability that the sample contains exactly two defective parts?

a. 0.0004
b. 0.0038
c. 0.10
d. 0.02

(10) For a continuous random variable X, the probability density function f(x) represents

a. the probability at a given value of x
b. the area under the curve at x
c. the area under the curve to the right of x
d. the height of the function at x

(11) When a continuous probability distribution is used to approximate a discrete probability distribution

a. a value of 0.5 is added and/or subtracted from the area
b. a value of 0.5 is added and/or subtracted from the value of x
c. a value of 0.5 is added to the area
d. a value of 0.5 is subtracted from the area

(12) Z is a standard normal random variable. Not using Z-table, P ($-1 \leq Z \leq 1$) can be judged to be closest to

a. 0.8942
b. 0.0558

c. 0.675
d. 0.7192

(13) X is a normally distributed random variable with a mean of 20 and a standard deviation of 4. Not using Z-table, the probability that X greater than or equal to 28 is approximately
a. 0.044
b. 0.055
c. 0.022
d. 0.033

(14) Sampling distribution of $\bar{x}$ is the
a. probability distribution of the sample mean
b. probability distribution of the sample proportion
c. mean of the sample
d. mean of the population

(15) The standard deviation of a sample of 100 elements taken from a very large population is determined to be 60. The variance of the population
a. can not be larger than 60
b. can not be larger than 3600
c. must be at least 100
d. can be any value greater or equal to zero

(16) A theorem that allows us to use the normal probability distribution to approximate the sampling distribution of sample means and sample proportions whenever the sample size is large is known as the
a. approximation theorem
b. normal probability theorem
c. central limit theorem
d. central normality theorem

(17) Random samples of size 81 are taken from an infinite population whose mean and standard deviation are 200 and 18, respectively. The distribution of the population is unknown. The mean and the standard error of the mean are
a. 200 and 18
b. 81 and 18
c. 9 and 2
d. 200 and 2

(18) Random samples of size 525 are taken from an infinite population whose population proportion is 0.3. The standard deviation of the sample proportions (i.e., the standard error of the proportion) is
a. 0.0004
b. 0.2100
c. 0.3000
d. 0.0200

(19) The absolute value of the difference between the point estimate and the population parameter it estimates is
a. the standard error
b. the sampling error
c. the margin of error
d. the error of confidence

(20) A population has a standard deviation of 50. A random sample of 100 items from this population is selected. The sample mean is determined to be 600. At 95% confidence, not using Z-table, the margin of error can be found to be
a. 5
b. 9.8
c. 650
d. 609.8

(21) For which of the following values of p (population proportion) is the value of p(1 - p) maximized?
a. p = 0.99
b. p = 0.90
c. p = 0.01
d. p = 0.50

(22) Using $\alpha = 0.04$, a confidence interval for a population proportion is determined to be 0.65 to 0.75. If the level of significance is decreased, the interval for the population proportion
a. becomes narrower
b. becomes wider
c. does not change
d. remains the same

(23) Whenever using the t distribution for interval estimation (when the sample size is very small), we must assume that
a. the sample has a mean of at least 30
b. the sampling distribution is not normal
c. the population is approximately normal
d. the finite population correction factor is necessary

(24) In a sample of 400 voters, 360 indicated they favor the incumbent governor. The 95% confidence interval of voters **not** favoring the incumbent is
a. 0.871 to 0.929
b. 0.120 to 0.280
c. 0.765 to 0.835
d. 0.071 to 0.129

(25) In hypothesis testing, the sum of the values of α and β
a. always add up to 1.0
b. always add up to 0.5
c. is the probability of Type II error
d. None of these alternatives is correct.

(26) The *p*-value is a probability that measures the support for the
a. null hypothesis
b. alternative hypothesis
c. either the null or the alternative hypothesis
d. sample statistic

(27) In order to test the following hypotheses at an α level of significance
$H_0: \mu \leq 800$ vs. $H_a: \mu > 800$
the null hypothesis will be rejected if the test statistic Z is
a. $\geq Z_\alpha$
b. $< Z_\alpha$
c. $< -Z_\alpha$
d. $= Z_\alpha$

(28) If a hypothesis is rejected at the 5% level of significance, it
a. will always be rejected at the 1% level
b. will always be accepted at the 1% level
c. will never be tested at the 1% level
d. may be rejected or not rejected at the 1% level

(29) The average manufacturing work week in metropolitan Chattanooga was 40.1 hours last year. It is believed that the recession has led to a reduction in the average work week. To test the validity of this belief, the hypotheses are
a. $H_0: \mu < 40.1$ vs. $H_a: \mu \geqq 40.1$
b. $H_0: \mu \geqq 40.1$ vs. $H_a: \mu < 40.1$
c. $H_0: \mu > 40.1$ vs. $H_a: \mu \leqq 40.1$
d. $H_0: \mu = 40.1$ vs. $H_a: \mu \neq 40.1$

(30) $n = 64$ $\bar{x} = 50$ $s = 16$ $H_0: \mu \geqq 54$ $H_a: \mu < 54$
The test statistic equals
a. -4
b. -3
c. -2
d. +2

(31) To compute an interval estimate for the difference between the means of two populations, the t distribution

a. is restricted to small sample situations
b. is not restricted to small sample situations
c. can be applied when the populations have equal means
d. None of these alternatives is correct.

(32) Salary information regarding male and female employees of a large company is shown below.

	Male	**Female**
Sample Size	64	36
Sample Mean Salary (in $1,000)	44	41
Population Variance (σ^2)	128	72

The standard error for the difference between the two means is
a. 4
b. 7.46
c. 4.24
d. 2.0

(33) In order to determine whether or not there is a significant difference between the hourly wages of two companies, the following data have been accumulated.

	Company A	**Company B**
Sample size	80	60
Sample mean	$16.75	$16.25
Population standard deviation	$1.00	$0.95

The test statistic is
a. 0.098
b. 1.645
c. 2.75
d. 3.01

(34) Referring to problem (33), the *p*-value is judged closest to
a. 0.0013
b. 0.0026
c. 0.0042
d. 0.0084

(35) To avoid the problem of not having access to tables of the F distribution with values given for the lower tail when a two-tailed test is required, let the smaller sample variance be
a. the denominator of the test statistic
b. the numerator of the test statistic
c. at least one
d. None of these alternatives is correct.

(36) The sampling distribution of the ratio of two independent sample variances taken from normal populations with equal variances is
a. an F distribution
b. a Chi-Square distribution

c. a t distribution
d. a normal distribution

(37) A sample of 60 items from population 1 has a sample variance of 8 while a sample of 40 items from population 2 has a sample variance of 10. If we test whether the variances of the two populations are equal, the **test statistic** will have a value of
a. 0.8
b. 1.56
c. 1.5
d. 1.25

(38) A goodness of fit test is always conducted as a
a. lower-tail test
b. upper-tail test
c. middle test
d. None of these alternatives is correct.

(39) In order not to violate the requirements necessary to use the chi-square distribution, each expected frequency in a goodness of fit test must be
a. at least 5
b. at least 10
c. no more than 5
d. less than 2

(40) The degrees of freedom for a contingency table with 10 rows and 11 columns is
a. 100
b. 110
c. 21
d. 90

(41) Last school year, the student body of a local university consisted of 30% freshmen, 24% sophomores, 26% juniors, and 20% seniors. A sample of 300 students taken from this year's student body showed the following number of students in each classification.

Freshmen	83
Sophomores	68
Juniors	85
Seniors	64

We are interested in determining whether or not there has been a significant change in the classifications between the last school year and this school year. The expected number of freshmen is
a. 83
b. 90
c. 30
d. 10

(42) Referring to problem (41), the calculated value for the test statistic equals
a. 0.5444
b. 300
c. 1.6615
d. 6.6615

(43) In factorial designs, the response produced when the treatments of one factor interact with the treatments of another in influencing the response variable is known as
a. main effect
b. replication
c. interaction
d. None of these alternatives is correct.

(44) An ANOVA procedure is applied to data obtained from 6 samples where each sample contains 20 observations. The degrees of freedom for the critical value of F are
a. 6 numerator and 20 denominator degrees of freedom
b. 5 numerator and 20 denominator degrees of freedom
c. 5 numerator and 114 denominator degrees of freedom
d. 6 numerator and 20 denominator degrees of freedom

(45) A randomized block design ANOVA table is demonstrated as below.

Source of Variation	**Sum of Squares**	**Degrees of Freedom**	**Mean Square**	**F**
Between Treat.	2,073.6	4		
Between Blocks	6,000	5	1,200	
Error		20	288	
Total		29		

The null hypothesis for this ANOVA problem is
a. $\mu_1=\mu_2=\mu_3=\mu_4$
b. $\mu_1=\mu_2=\mu_3=\mu_4=\mu_5$
c. $\mu_1=\mu_2=\mu_3=\mu_4=\mu_5=\mu_6$
d. $\mu_1=\mu_2=\ldots=\mu_{20}$

(46) Referring to problem (45), the sum of squares due to error equals
a. 14.4
b. 2,073.6
c. 5,760
d. 6,000

(47) Referring to problem (45), the test statistic to test the null hypothesis equals
a. 0.432
b. 1.8
c. 4.17
d. 28.8

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(48) In a regression analysis, the coefficient of determination is 0.4225. The coefficient of correlation in this situation is

a. 0.65
b. 0.1785
c. any positive value
d. any value

(49) The following information regarding a dependent variable (Y) and an independent variable (X) is provided.

Y	X
4	2
3	1
4	4
6	3
8	5

SSR = 10 SST = 16

The least squares estimate of the Y intercept is

a. 1
b. 2
c. 3
d. 4

(50) Referring to problem (49), the MSE is

a. 1
b. 2
c. 3
d. 4