國立中央大學104學年度硕士班考試入學試題

所別：產業經濟研究所碩士班 產業經濟組(一般生)　科目：統計學　共 5 頁　第 1 頁

本科考試禁用計算器　　＊請在答案卷（卡）內作答

參考用

Please list your answers according to the order of the questions. Otherwise, 10 points will be deducted from your total score. Also, calculator is not allowed to use.

A. Multiple Choice (60%, 4% each)

1) The smaller the spread of scores around the arithmetic mean,
A) the smaller the interquartile range.
B) the smaller the standard deviation.
C) the smaller the coefficient of variation.
D) All the above.

2) According to the Chebyshev rule, at least 93.75% of all observations in any data set are contained within a distance of how many standard deviations around the mean?
A) 1
B) 2
C) 3
D) 4

3) If two events are independent, what is the probability that they both occur?
A) 0
B) 0.50
C) 1.00
D) Cannot be determined from the information given

4) The probability that house sales will increase in the next 6 months is estimated to be 0.25. The probability that the interest rates on housing loans will go up in the same period is estimated to be 0.74. The probability that house sales or interest rates will go up during the next 6 months is estimated to be 0.89. The probability that house sales will increase but interest rates will not during the next 6 months is
A) 0.065.
B) 0.15.
C) 0.51.
D) 0.89.

注意:背面有試題

5) A company has 2 machines that produce widgets. An older machine produces 23% defective widgets, while the new machine produces only 8% defective widgets. In addition, the new machine produces 3 times as many widgets as the older machine does. Given a randomly chosen widget was tested and found to be defective, what is the probability it was produced by the new machine?
A) 0.08
B) 0.15
C) 0.489
D) 0.511

6) A campus program evenly enrolls undergraduate and graduate students. If a random sample of 4 students is selected from the program to be interviewed about the introduction of a new fast food outlet on the ground floor of the campus building, what is the probability that all 4 students selected are undergraduate students?
A) 0.0256
B) 0.0625
C) 0.16
D) 1.00

7) A catalog company that receives the majority of its orders by telephone conducted a study to determine how long customers were willing to wait on hold before ordering a product. The length of waiting time was found to be a random variable best approximated by an exponential distribution with a mean length of waiting time equal to 3 minutes (i.e. the mean number of calls answered in a minute is 1/3). What proportion of customers having to hold more than 1.5 minutes will hang up before placing an order?
A) 0.86466
B) 0.60653
C) 0.39347
D) 0.13534

8) A sample of 300 subscribers to a particular magazine is selected from a population frame of 9,000 subscribers. If, upon examining the data, it is determined that no subscriber had been selected in the sample more than once,
A) the sample could not have been random.
B) the sample may have been selected without replacement or with replacement.
C) the sample had to have been selected with replacement.
D) the sample had to have been selected without replacement.

注意：背面有試題

9) Suppose a 95% confidence interval for μ has been constructed. If it is decided to take a larger sample and to decrease the confidence level of the interval, then the resulting interval width would _____. (Assume that the sample statistics gathered would not change very much for the new sample.)
A) be larger than the current interval width
B) be narrower than the current interval width
C) be the same as the current interval width
D) be unknown until actual sample sizes and reliability levels were determined

10) You know that the level of significance (α) of a test is 5%, you can tell that the probability of committing a Type II error (β) is
A) 2.5%.
B) 95%.
C) 97.5%.
D) unknown.

11) The *t* test for the difference between the means of 2 independent populations assumes that the respective
A) sample sizes are equal.
B) sample variances are equal.
C) populations are approximately normal.
D) All of the above.

12) Which of the following components in an ANOVA table are not additive?
A) Sum of squares
B) Degrees of freedom
C) Mean squares
D) It is not possible to tell.

13) If we wish to determine whether there is evidence that the proportion of items of interest is the same in group 1 as in group 2, the appropriate test to use is
A) the *Z* test.
B) the X^2 test.
C) Both A and B.
D) Neither A nor B.

14) Which of the following methods should not be used for short-term forecasts into the future?
A) Exponential smoothing
B) Moving averages
C) Linear trend model
D) Autoregressive modeling

15) Which of the following statements about the method of exponential smoothing is **not** true?
A) It gives greater weight to more recent data.
B) It can be used for forecasting.
C) It uses all earlier observations in each smoothing calculation.
D) It gives greater weight to the earlier observations in the series.

B. Problem (40%)

1) 10%
The managing partner of an advertising agency believes that his company's sales are related to the industry sales. He uses Microsoft Excel to analyze the last 4 years of quarterly data (i.e., $n = 16$) with the following results:

Regression Statistics	
Multiple R	0.802
R Square	0.643
Adjusted R Square	0.618
Standard Error SYX	0.9224
Observations	16

ANOVA

	df	SS	MS	F	Sig.F
Regression	1	21.497	21.497	25.27	0.000
Error	14	11.912	0.851		
Total	15	33.409			

Predictor	Coef	StdError	t Stat	*p*-value
Intercept	3.962	1.440	2.75	0.016
Industry	0.040451	0.008048	5.03	0.000

Durbin-Watson Statistic　1.59

a) Referring to Table, the value of the quantity that the least squares regression line minimizes is _____.(3%)

b) Referring to Table, the prediction for a quarter in which $X = 120$ is $Y =$ _____.(3%)

c) Referring to Table, the standard error of the estimate is _____.(2%)

d) Referring to Table, the standard error of the estimated slope coefficient is _____.(2%)

參考用

2) 30%, 10% each

Two different designs on a new line of winter jackets for the coming winter are available for your manufacturing plants. Your profit (in thousands of dollars) will depend on the taste of the consumers when winter arrives. The probability of the three possible different tastes of the consumers and the corresponding profits are presented in the following table.

Probability	Taste	Design A	Design B
0.2	more conservative	180	520
0.5	no change	230	310
0.3	more liberal	350	270

a) Referring to Table, if you decide to choose Design A for half of the production lines and Design B for the other half, what is your expected profit?

b) Referring to Table, if you decide to choose Design A for half of the production lines and Design B for the other half, what is the risk of your investment?

c) Referring to Table, if you decide to choose Design A for half of the production lines and Design B for the other half, what is the coefficient of variation of your investment?