

國立中央大學99學年度碩士班考試入學試題卷

所別：資訊管理學系碩士班 甲組(一般生) 科目：統計學 共 2 頁 第 1 頁
乙組(一般生)

*請在試卷答案卷(卡)內作答
*本科考試禁用計算器

- (8 points) Let X and Y be random variables. Compare $\rho_{XY} = 0$ with "X and Y are independent."
- (10 points) What are binomial distribution, Poisson distribution, gamma distribution, and exponential distribution? Describe the relationship among those four distributions.
- (8 points) Let X denote the number of heads that occur when four coins are tossed at random. Under the assumptions that the four coins are independent and the probability of heads on each coin is $\frac{1}{2}$, X is $b(4, \frac{1}{2})$. One hundred repetitions of this experiment resulted in 0, 1, 2, 3, and 4 heads being observed on 7, 18, 40, 31, and 4 trials, respectively. Do these results support the assumption? That is, is $b(4, \frac{1}{2})$ a reasonable model for the distribution of X? ($\chi^2_{0.05}(4) = 9.488$)
- (8 points) A new manager was hired to improve morale at a government agency. The previous manager had alienated volunteers and staff; employee morale had declined dramatically, product quality and customer service were ranked as very poor by the agency's clients, and volunteer retention was becoming a major problem. The manager wanted to determine if both staff workers and volunteers perceived the company climate in the same way. A seven-point composite organizational climate scale was administered to a random selection of twenty workers and fifteen volunteers. The manager's null hypothesis was: "There is no difference in the way staff employees and volunteers rate the organization's climate." To test this hypothesis, a one-way analysis of variance procedure was used. The results of the procedure are presented below. Please interpret the results.

SUMMARY

Group	Count	Sum	Average	Variance
Staff	25	110	4.4	1.666667
Management	20	49	2.45	1.102632

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	42.25	1	42.25	29.80722	0.0000	4.067047
Within Groups	60.95	43	1.417442			
Total	103.2	44				

- (15 points) Please state the definition of the following statistical measures: variance, standard deviation, coefficient of variation, range, mean absolute deviation and interquartile range; besides, compare the advantages and disadvantages of the aforementioned measures when they apply.
- (12 points) Regarding sampling, (1) if you are asked to perform a survey within a specified sampling error, a probabilistic or a non-probabilistic sampling method you have to use? (3 points) (2) Moreover, if you are asked to avoid systematic occurrence of characteristics and partial sample concentration, what kind of sampling method you would suggest? (3 points) (3) In case the population size is 1000, coded from 1 to 1000, and the sample size is 5, please find the codes you are to choose assuming that you are given the following random numbers in sequence: 0.020, 0.268, 0.506, 0.919, 0.925. (6 points)
- (7 points) You use the simple random sampling to choose 25 objects from a population size of 100. One of the 25 objects is defected. Given that the coefficient of confidence is 0.95, please find the confidence interval of the defection rate. ($Z_{0.05} = 1.645$, $Z_{0.025} = 1.96$)
- (10 points) Please state when to use the nonparametric tests.
- (3 points) If $r_{XY} = .60$, the proportion of variance in Y that is not predictable from X is ____.
- (3 points) Suppose the midterm and the final examination correlated .60 for this class, but because of the good effort of the class, a bonus of 20 points was added to each student's final exam score. Consequently, the value of r would be ____.
- (3 points) The variance of variable X is 9; the variance of variable Y is 4; the covariance of X and Y is 2. What is the value of r_{XY} ____?

注意：背面有試題

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12. (3 points) () If the variance of X and Y are increased, but their covariance remains constant, the value of r will
- (1) Decrease.
 - (2) Increase.
 - (3) Be unchanged
13. (10 points) An ice cream store, close to a college campus, contemplated a new recipe for the ice cream flavor. A random sample of eight students was chosen, and each was asked to compare on a scale from 1 to 10 the taste of the two flavors. The scores of the taste comparison are shown as follows, with higher numbers indicating a greater liking of the flavor. Do the data indicate an overall tendency to prefer the new ice cream recipe ($\alpha = .05$) ?
- (1) State your hypothesis.
 - (2) Calculate the test statistics.
 - (3) State your decision.
 - (4) What is your conclusion?

TASTER	RATING	
	Original Recipe	New Recipe
A	6	8
B	4	9
C	5	4
D	8	7
E	3	9
F	6	9
G	7	7
H	5	9

Cutoff Points for the Distribution of the Wilcoxon Test Statistic
for sample size n, the table shows, for selected probabilities α , the numbers T_α such
that $P(T \leq T_\alpha) = \alpha$, where the distribution of the random variable T is that of the
Wilcoxon test statistic under the null hypothesis.

n	α				
	.005	.010	.025	.050	.100
4	0	0	0	0	1
5	0	0	0	1	3
6	0	0	1	3	4
7	0	1	3	4	6
8	1	2	4	6	9
9	2	4	6	9	11
10	4	6	9	11	15
11	6	8	11	14	18
12	8	10	14	18	22
13	10	13	18	22	27
14	13	16	22	26	32
15	16	20	26	31	37
16	20	24	30	36	43
17	24	28	35	42	49
18	28	33	41	48	56
19	33	38	47	54	63
20	38	44	53	61	70

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參考用