

國立嘉義大學九十六學年度

資訊管理學系碩士班招生考試（甲組）試題

科目：統計學

一、計算題：

1. 一實驗設計包含 X、Y 兩項因子，其中 X 因子包含三項水準，Y 因子包含二項水準，結合兩項因子，實驗中共含六項處理，每一處理皆含五個重複(replicates)，顯著水準為 0.05，實驗結果顯示 $SSX=150$ ， $MSY=100$ ， $MSE=30$ ， $SST=1000$ ，並可表達如表 1。

(1) 請根據上列資料回答表 1 中(1)~(15)格對應之數據。(請依 (1)____、(2)____、...、(15)____方式依序填答) (30 分)

(2) 解釋實驗的結果。(5 分)

表 1

Source	Degree of Freedom	Mean Square of Variance	F	Critical value of F (at the significant level of 0.05)
X	(1)	(6)	(10)	(13)
Y	(2)	(7)	(11)	(14)
XY	(3)	(8)	(12)	(15)
Error	(4)	(9)		
Total	(5)			

2. 某公司擬推動品管圈，一部門被選定為實驗單位，用以瞭解推行品管圈後，該單位之工作品質是否較為提昇，經由實驗結果來判斷是否全面實施，各部門全面實施將較以往多出 10% 的人事與獎金預算。

(1) 指出上述實驗檢定之 H_0 。(5 分)

(2) 指出上述實驗檢定之 Type I error 與 Type II error。(10 分)

(3) 上述實驗檢定之顯著水準若由 $\alpha=0.05$ 降為 $\alpha=0.01$ ，對 H_0 、Type I error、Type II error 分別會造成什麼影響？(10 分)

二、選擇/填充題：(每題 5 分，共 40 分)

1. A regression function for variables X and Y was derived as $y = 7.6 - 3.2x$. Which of the following statements about X and Y is true?

(1) The correlation coefficient associated with this function would be positive.

(2) X causes Y.

(3) If the correlation coefficient is 0, this indicates that there is no relationship between X and Y.

(4) None of the above.

2. When the error terms at successive points in time are significantly related. The correlation in error terms is named

(1) Multicorrelation (2) Autocorrelation (3) Parallel correlation (4) Canonical correlation.

3. Application of the least squares method results in values of the y intercept and the slope which minimizes the sum of the squared deviations between

(1) the observed values of the dependent variable and the estimated values of the dependent variable.

(2) the actual values of the dependent variable and the estimated values of the independent variable.

(3) the observed values of the independent variable and the estimated values of the independent variable.

(4) the actual values of the independent variable and the estimated values of dependent variable.

4. Which of the followings is a characteristic of the normal probabilities distribution?

(1) mean = media = mode

(2) The standard deviation = 1

(3) The mean = 0

(4) The normal distribution is the limiting case of a Poisson distribution as the sample size becomes large.

5. Let X_1, X_2, \dots, X_n be a random sample from $N(\mu, \sigma^2)$. Which of the following estimate of μ is unbiased?

(1) $\hat{\mu} = \frac{\sum_{i=1}^n X_i}{n}$

(2) $\hat{\mu} = \text{media of } X_i (i=1, 2, \dots, n)$

(3) $\hat{\mu} = \frac{X_1}{2} + \frac{\sum_{i=2}^n X_i}{2(n-1)}$

(4) none of the above.

6. Assume the test scores for 100 students in a course had a mean of 80 and a variance of 25. Use Cebyshev's theorem to estimate that at least how many students pass the test (i.e. $60 \leq \text{score} \leq 100$)? _____.

7. The time between arrivals of customers at a particular intersection follows an exponential probability distribution with a mean 15 minutes. The probability that there will be 30 or more minutes between arriving customers is _____.

8. Consider the following data set:

X	5	7	6	3	1	8	3	7	6
Y	4	3	4	1	1	4	2	4	5

Using the regression equation to predict the Y value when $X=12$. $\hat{Y} =$ _____.

附表：

F分配(0.05)	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	249.05	250.10	251.14	252.20	253.25
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35