

國立勤益技術學院九十四學年度研究所碩士班招生筆試試題卷
 所別：流通科技管理研究所 組別：經營管理組、科技應用組
 身分別：一般生
 科目：統計學 准考證號碼： (考生自填)

考生注意事項：
 一、考試時間 100 分鐘。
 二、答題時需標註標題。

試題一： 20 分

今為了解台中縣家庭之子女數與家長教育程度是否有關，乃隨機抽樣 400 戶家庭調查，其資料如下：

子女人數 \ 教育程度	0-1	2-3	三個以上
大學(含)以上	2 8 (A)	7 4	6 4
專科	3 8	8 4	3 4 (C)
高中	2 4	3 4 (B)	2 0

試求：

- (1) 請算出細格內(cells) A、B、C 之值 (A、B、C 代表『期望次數』) (6%)
- (2) 請檢定子女人數與家長教育程度是否有關？($\alpha=0.05$)
 (請列出所有檢定步驟，否則不予計分) (14%)

試題二： 10 分

Let X equal the number of telephone calls that are received at the college switchboard from on-campus during a 15-minute period. The following numbers of calls were received during each of 26 time periods: 4, 8, 5, 3, 1, 3, 2, 5, 6, 7, 4, 4, 5, 2, 3, 6, 4, 1, 2, 5, 6, 7, 5, 7, 5, 1.

- (a) Calculate the sample mean and sample variance for these data. Are they approximately equal to each other?
- (b) Assume that $\lambda=4.2$, Calculate the porobability $P(X \leq 4)$. Compare $P(X \leq 4)$ with the proportion of observations that are less than or equal to 4.

試題三： 15 分

某公司試銷 A 產品，乃將三種價格隨機分派於 12 家分店，其銷售量如下：
($\alpha=0.05$)

價格	銷售量
10 元	15, 17, 18, 19
12 元	25, 20, 18, 20
15 元	32, 24, 28, 26

- (1) 請檢定不同價格策略下銷售量是否相同？($\alpha=0.05$) (請列出所有檢定步驟，否則不予計分) (10%)
- (2) 若檢定後發現有差異，則應使用 Tukey 法 或 Scheffe'法 來作「事後比較」可以得到較佳的結果？請說明理由。(5%)

試題四： 10 分

Let X equal the outcome when a four-sided die is rolled. Let Y equal the outcome when a six-sided die is rolled. Let $W=X+Y$.

- (c) Find the moment-generating function of W.
- (d) Give the p.d.f. of W.

試題五： 15 分

設 X 與 Y 為兩個隨機變數，其聯合機率如下表所示：

Y \ X	-1	0	1	f(Y)
0	0	0.2	0.4	D
1	A	0.1	0.1	E
f(x)	B	C	0.5	F

試算出：

- (1) 計算 $P(X=Y) = ?$ 與 $P(X>Y) = ?$ (5%)
- (2) 若 $W = X + Y$ ，算出 W 之機率分配？， $E(W) = ?$ ， $V(W) = ?$ (5%)
- (3) 算出 X 與 Y 之共變數與相關係數？(5%)

試題六： 15 分

Let X have the p.d.f. $f(x) = \frac{x^2}{3}, -1 < x < 2$.

Find the p.d.f. of $Y = X^2$.

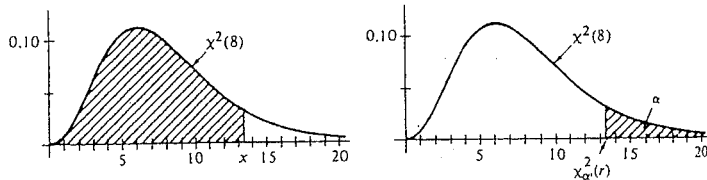
試題七： 15 分

The midterm and final exam scores of 9 students in a statistics are tabulated as shown.

- (e) Calculate the least squares regression line for these data.
- (f) Find the coefficient of determination (R^2).
- (g) Find the variance of residual ($\hat{\sigma}^2$).

midterm	56	78	65	35	59	65	80	49	45
final	65	79	78	65	76	69	89	60	56

The Chi-Square Distribution



$$P(X \leq x) = \int_0^x \frac{1}{\Gamma(r/2)2^{r/2}} w^{r/2-1} e^{-w/2} dw$$

r	P(X ≤ x)							
	0.010	0.025	0.050	0.100	0.900	0.950	0.975	0.990
	$\chi_{0.99}^2(r)$	$\chi_{0.975}^2(r)$	$\chi_{0.95}^2(r)$	$\chi_{0.90}^2(r)$	$\chi_{0.10}^2(r)$	$\chi_{0.05}^2(r)$	$\chi_{0.025}^2(r)$	$\chi_{0.01}^2(r)$
1	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635
2	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210
3	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.34
4	0.297	0.484	0.711	1.064	7.779	9.488	11.14	13.28
5	0.554	0.831	1.145	1.610	9.236	11.07	12.83	15.09
6	0.872	1.237	1.635	2.204	10.64	12.59	14.45	16.81
7	1.239	1.690	2.167	2.833	12.02	14.07	16.01	18.48
8	1.646	2.180	2.733	3.490	13.36	15.51	17.54	20.09
9	2.088	2.700	3.325	4.168	14.68	16.92	19.02	21.67
10	2.558	3.247	3.940	4.865	15.99	18.31	20.48	23.21
11	3.053	3.816	4.575	5.578	17.28	19.68	21.92	24.72
12	3.571	4.404	5.226	6.304	18.55	21.03	23.34	26.22
13	4.107	5.009	5.892	7.042	19.81	22.36	24.74	27.69
14	4.660	5.629	6.571	7.790	21.06	23.68	26.12	29.14
15	5.229	6.262	7.261	8.547	22.31	25.00	27.49	30.58
16	5.812	6.908	7.962	9.312	23.54	26.30	28.84	32.00
17	6.408	7.564	8.672	10.08	24.77	27.59	30.19	33.41
18	7.015	8.231	9.390	10.86	25.99	28.87	31.53	34.80
19	7.633	8.907	10.12	11.65	27.20	30.14	32.85	36.19
20	8.260	9.591	10.85	12.44	28.41	31.41	34.17	37.57
21	8.897	10.28	11.59	13.24	29.62	32.67	35.48	38.93
22	9.542	10.98	12.34	14.04	30.81	33.92	36.78	40.29
23	10.20	11.69	13.09	14.85	32.01	35.17	38.08	41.64
24	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98
25	11.52	13.12	14.61	16.47	34.38	37.65	40.65	44.31
26	12.20	13.84	15.38	17.29	35.56	38.88	41.92	45.64
27	12.88	14.57	16.15	18.11	36.74	40.11	43.19	46.96
28	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28
29	14.26	16.05	17.71	19.77	39.09	42.56	45.72	49.59
30	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89
40	22.16	24.43	26.51	29.05	51.80	55.76	59.34	63.69
50	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15
60	37.48	40.48	43.19	46.46	74.40	79.08	83.30	88.38
70	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.4
80	53.34	57.15	60.39	64.28	96.58	101.9	106.6	112.3

TABLE VII (continued)

$$P(F \leq f) = \int_0^f \frac{\Gamma(r_1 + r_2)/2 (r_1/r_2)^{r_1/2} w^{r_1/2-1}}{\Gamma(r_1/2)\Gamma(r_2/2)(1 + r_1 w/r_2)^{(r_1+r_2)/2}} dw$$

α	P(F ≤ f)	Den. d.f. r ₂	Numerator Degrees of Freedom, r ₁									
			1	2	3	4	5	6	7	8	9	10
0.05	0.95	1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9
0.025	0.975		647.79	799.50	864.16	899.58	921.85	937.11	948.22	956.66	963.28	968.63
0.01	0.99		4052	4999.5	5403	5625	5764	5859	5928	5981	6022	6056
0.05	0.95	2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40
0.025	0.975		38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39	39.40
0.01	0.99		98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40
0.05	0.95	3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79
0.025	0.975		17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47	14.42
0.01	0.99		34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23
0.05	0.95	4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96
0.025	0.975		12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90	8.84
0.01	0.99		21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55
0.05	0.95	5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74
0.025	0.975		10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68	6.62
0.01	0.99		16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05
0.05	0.95	6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06
0.025	0.975		8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52	5.46
0.01	0.99		13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87
0.05	0.95	7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64
0.025	0.975		8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82	4.76
0.01	0.99		12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62
0.05	0.95	8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35
0.025	0.975		7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36	4.30
0.01	0.99		11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81
0.05	0.95	9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
0.025	0.975		7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03	3.96
0.01	0.99		10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26
0.05	0.95	10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
0.025	0.975		6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78	3.72
0.01	0.99		10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85