

請注意：未寫出計算式者不計分。請計算至小數點第二位，四捨五入。

一、下面是男性、女性對某一新牌子牙膏味道的反應調查資料，請用卡方(Chi-square)檢定性別與味道的反應是否有關？(α = 0.05) (10分)

	男性	女性
喜歡該味道	65	80
不喜歡該味道	40	60

二、欲檢定單因子變異數分析的假設  $H_0: \mu_1 = \mu_2 = \mu_3$ ，若 ANOVA 分析表之部分結果如下：

- 請在答案紙上複製此一 ANOVA 表，並完成此一表格。(8分)
- 請就此一表格之結果對上述之假設作結論(α = 0.05)，並請說明後續應有何者分析？請列出虛無假設(null hypotheses)。(8分)

變異來源	平方和	自由度	均方	F-比值
處理方式			306.4	
殘差				
總和	4211.6	42		

三、已知下列 6 組(x,y)值：

X	1	2	3	4	5	6
Y	8	9	9	10	11	12

- 請計算簡單迴歸估計式： $\hat{y} = b_0 + b_1x_i$  (8分)
- 請計算上述迴歸估計式之判定係數  $R^2$  (coefficient of determination) (8分)
- 請計算上述資料之簡單相關係數 (8分) (不必有計算式，可直接寫出答案)

表 7 F 分配右尾百分點  $F_{\alpha}(v_1, v_2)$  (續)  
α = 0.05

$v_2 \backslash v_1$	1	2	3	4	5	6	7	8	9
1	161.43	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
2	18.513	19.000	19.164	19.247	19.296	19.330	19.353	19.371	19.385
3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8868	8.8452	8.8123
4	7.7086	6.9443	6.5914	6.3883	6.2560	6.1631	6.0942	6.0410	5.9988
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2066	4.1468	4.0990
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767
8	5.3177	4.4590	4.0662	3.8378	3.6875	3.5806	3.5005	3.4381	3.3881
9	5.1174	4.2565	3.8626	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789
10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876
16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377
17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563
19	4.3808	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227
20	4.3513	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3661
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419
23	4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002
25	4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821
26	4.2252	3.3690	2.9751	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655
27	4.2100	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501
28	4.1960	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.2360
29	4.1830	3.3277	2.9340	2.7014	2.5454	2.4324	2.3463	2.2782	2.2229
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107
40	4.0848	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240
60	4.0012	3.1504	2.7581	2.5252	2.3663	2.2540	2.1665	2.0970	2.0401
120	3.9201	3.0718	2.6802	2.4472	2.2900	2.1750	2.0867	2.0164	1.9588
∞	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8800

表 6  $\chi^2$ -分配右尾百分點  $\chi^2_{\alpha}(d.f.)$

$d.f. \backslash \alpha$	.995	.990	.975	.950	.900	.850	.800	.750
1	$392704 \times 10^{-10}$	$157088 \times 10^{-9}$	$982069 \times 10^{-9}$	$393214 \times 10^{-8}$	3.84146	5.02389	6.63490	7.87944
2	.01000251	.0201007	.0506356	.102587	5.99147	7.37776	9.21034	10.5966
3	.0717212	.114832	.215795	.351846	7.81473	9.34840	11.3449	12.8381
4	.206990	.297110	.484419	.710721	9.48773	11.1433	13.2767	14.8602
5	.411740	.554300	.831211	1.145476	11.0705	12.8325	15.0863	16.7496
6	.675727	.872085	1.237347	1.63539	12.5916	14.4494	16.8119	18.5476
7	.989265	1.239043	1.68987	2.16735	14.0671	16.0128	18.4753	20.2777
8	1.344419	1.646482	2.17973	2.73264	15.5073	17.5346	20.0902	21.9550
9	1.734926	2.087912	2.70039	3.32511	16.9190	19.0228	21.6660	23.5893
10	2.15585	2.55821	3.24697	3.94030	18.3070	20.4831	23.2093	25.1882
11	2.60321	3.05347	3.81575	4.57481	19.6751	21.9200	24.7250	26.7569
12	3.07382	3.57056	4.40379	5.22603	21.0261	23.3367	26.2170	28.2995
13	3.56503	4.10691	5.00874	5.89186	22.3621	24.7356	27.6883	29.8194
14	4.07468	4.66043	5.62872	6.57063	23.6848	26.1190	29.1413	31.3193
15	4.60094	5.22935	6.26214	7.26094	24.9958	27.4884	30.5779	32.8013
16	5.14224	5.81221	6.90766	7.96164	26.2962	28.8454	31.9999	34.2672
17	5.69724	6.40776	7.56418	8.67176	27.5871	30.1910	33.4087	35.7185
18	6.26481	7.01491	8.23075	9.39046	28.8693	31.5264	34.8053	37.1564
19	6.84398	7.63273	8.90655	10.1170	30.1435	32.8523	36.1908	38.5822
20	7.43386	8.26040	9.59083	10.8508	31.4104	34.1696	37.5662	39.9968
21	8.03366	8.89720	10.28293	11.5913	32.6705	35.4789	38.9321	41.4010
22	8.64272	9.54249	10.9823	12.3380	33.9244	36.7807	40.2894	42.7956
23	9.26042	10.19567	11.6885	13.0905	35.1725	38.0757	41.6384	44.1813
24	9.88623	10.8564	12.4011	13.8484	36.4151	39.3641	42.9798	45.5585
25	10.5197	11.5240	13.1197	14.6114	37.6525	40.6465	44.3141	46.9278
26	11.1603	12.1981	13.8439	15.3791	38.8852	41.9232	45.6417	48.2899
27	11.8076	12.8786	14.5733	16.1513	40.1133	43.1944	46.9630	49.6449
28	12.4613	13.5648	15.3079	16.9279	41.3372	44.4607	48.2782	50.9933
29	13.1211	14.2565	16.0471	17.7083	42.5569	45.7222	49.5879	52.3356
30	13.7867	14.9535	16.7908	18.4926	43.7729	46.9792	50.8922	53.6730
40	20.7065	22.1643	24.4331	26.5093	55.7585	59.3417	63.6907	66.7659
50	27.9907	29.7067	32.3574	34.7642	67.5048	71.4202	76.1539	79.4900
60	35.5346	37.4848	40.4817	43.1879	79.0819	83.2976	88.3794	91.9517
70	43.2752	45.4418	48.7576	51.7393	90.5312	95.0231	100.425	104.215
80	51.1720	53.5400	57.1532	60.3915	101.879	106.629	112.329	116.321
90	59.1963	61.7541	65.6466	69.1260	113.145	118.136	124.116	128.299
100	67.3276	70.0648	74.2219	77.9295	124.342	129.561	135.807	140.169

- 10% 四、The percentage of Ds and Fs awarded to students by two college history professors was duly noted by the dean. Professor I achieved a rate equal to 32% as opposed to 21% for professor II, based upon 200 and 180 students, respectively. Estimate the difference in the percentage of Ds and Fs awarded by the professors. What is the margin of error?
- 20% 五、A new car dealer calculated that the company must average more than 4.8% profit on the sales of its allotted new cars. A random sampling of  $n=80$  cars gave a mean and standard deviation of the percentage profit per car of  $\bar{X}=4.87\%$  and  $s=3.9\%$ .
- (a) Do the data provide sufficient evidence to indicate that the sales manager's policy in approving sale prices is achieving a mean profit exceeding 4.8% per car? State the alternative hypothesis that the sales manager wants to show to be true.
- (b) Examine the data. From your intuition only, do you think that the data support the alternative hypothesis of part (a)? Why?
- (c) The company's owner wants to be reasonably certain that the decision is correct if, in fact, the data show that the company is operating at an acceptable profit level. To accomplish this, the owner wants to test the null hypothesis using  $\alpha=0.01$ . Explain how this choice for  $\alpha$  will accomplish the owner's objective.
- (d) Conduct the test and state your conclusions in a manner that will be understandable to the company's owner. Compare your answer with your intuitive guess in part (b).
- 5% 六、In a random sample of 20 executive secretaries, 15 favor copy machine A over copy machine B. If the machines are equally desirable, the probability that a person will select machine A over B is 0.5. What is the probability that the number  $x$ , favoring machine A, in the sample of 20 is equal to 15 or larger if  $p=0.5$ ?
- 15% 七、The mean percentage profit per project is not the only concern of a real estate developer. The developer must be concerned with a large variation in gain, because a large negative gain could put the developer out of business. A particular developer plans projects so as to achieve a mean profit per project of 12% with a range no larger than 25%. A sampling of the percentage profit per project for the last 25 of the developer's projects produced a sample mean and standard deviation equal to 11.1% and 5.2%, respectively.
- (a) Suppose that the developer wants to be fairly certain that the range of the percentage profit per project is no more than 25%. What value of  $\sigma$  will achieve this goal?
- (b) Do the data provide sufficient evidence to indicate that the variation in percentage profit per job is greater than the value of  $\sigma$  specified in part (a)? Test using  $\alpha=0.05$ .
- (c) Find a 95% confidence interval for the variance of the percentage profit per job for the developer, and interpret the interval.

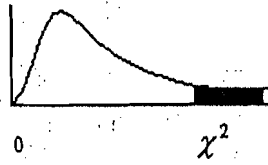
中國文化大學 98 學年度碩士班考試入學

系組：國際貿易學系碩士班 一般生

日期節次：98

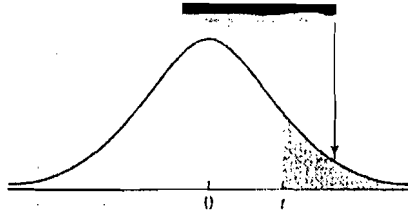
科目：統計學[4533]

附表 卡方分配表



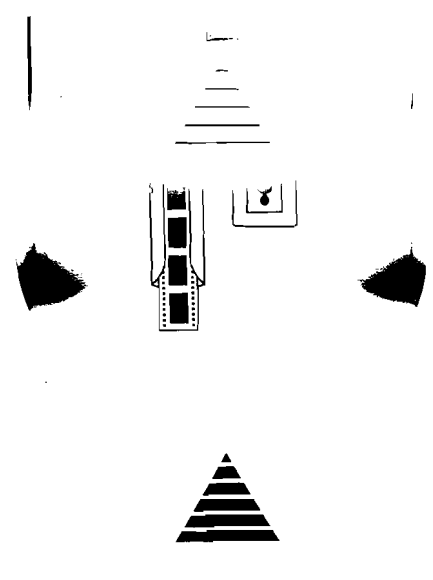
卡方分配底下之右尾面積	
自由度	.995 .990 .975 .950 .900 .100 .050 .025 .010 .005
1	0.000 0.000 0.001 0.004 0.016 2.706 3.841 5.024 6.635 7.878
2	0.010 0.020 0.051 0.103 0.211 4.605 5.991 7.378 9.210 10.597
3	0.072 0.115 0.216 0.352 0.584 6.251 7.815 9.348 11.345 12.838
4	0.207 0.297 0.484 0.711 1.064 7.779 9.488 11.143 13.277 14.860
5	0.412 0.554 0.831 1.145 1.610 9.236 11.070 12.833 15.086 16.750
6	0.676 0.872 1.237 1.635 2.204 10.645 12.592 14.449 16.812 18.548
7	0.989 1.239 1.690 2.167 2.833 12.017 14.067 16.013 18.475 20.278
8	1.344 1.646 2.180 2.733 3.490 13.362 15.507 17.535 20.090 21.955
9	1.735 2.088 2.700 3.325 4.168 14.684 16.919 19.023 21.666 23.589
10	2.156 2.558 3.247 3.940 4.865 15.987 18.307 20.483 23.209 25.188
11	2.603 3.053 3.816 4.575 5.578 17.275 19.675 21.920 24.725 26.757
12	3.074 3.571 4.404 5.226 6.304 18.549 21.026 23.337 26.217 28.300
13	3.565 4.107 5.009 5.892 7.042 19.812 22.362 24.736 27.688 29.819
14	4.075 4.660 5.629 6.571 7.790 21.064 23.685 26.119 29.141 31.319
15	4.601 5.229 6.262 7.261 8.547 22.307 24.996 27.488 30.578 32.801
16	5.142 5.812 6.908 7.962 9.312 23.542 26.296 28.845 32.000 34.267
17	5.697 6.408 7.564 8.672 10.088 24.769 27.587 30.191 33.409 35.718
18	6.265 7.018 8.231 9.390 10.865 25.989 28.869 31.526 34.805 37.156
19	6.844 7.633 8.907 10.117 11.651 27.204 30.144 32.852 36.191 38.587
20	7.434 8.260 9.591 10.851 12.443 28.412 31.410 34.170 37.566 39.997
21	8.034 8.897 10.283 11.591 13.240 29.615 32.671 35.479 38.932 41.401
22	8.643 9.542 10.982 12.338 14.041 30.813 33.924 36.781 40.289 42.796
23	9.260 10.196 11.689 13.091 14.848 32.007 35.172 38.076 41.638 44.181
24	9.886 10.856 12.401 13.848 15.659 33.196 36.415 39.364 42.980 45.559
25	10.520 11.524 13.120 14.611 16.473 34.382 37.652 40.646 44.314 46.928
26	11.160 12.198 13.844 15.379 17.292 35.563 38.885 41.923 45.642 48.290
27	11.808 12.879 14.573 16.151 18.114 36.741 40.113 43.195 46.963 49.645
28	12.461 13.565 15.308 16.928 18.939 37.916 41.337 44.461 48.278 50.993
29	13.121 14.256 16.047 17.708 19.768 39.087 42.557 45.722 49.588 52.330
30	13.787 14.953 16.791 18.493 20.599 40.256 43.773 46.979 50.892 53.672
40	20.707 22.164 24.433 26.509 29.051 51.805 55.58 59.342 63.691 66.766
50	27.991 29.707 32.357 34.764 37.689 63.167 67.505 71.420 76.154 79.490
60	35.534 37.485 40.482 43.188 46.459 74.397 79.082 83.298 88.379 91.952
70	43.275 45.442 48.758 51.739 55.329 85.527 90.531 95.023 100.425 104.215
80	51.172 53.540 57.153 60.391 64.278 96.578 101.879 106.629 112.329 116.321
90	59.196 61.754 65.647 69.126 73.291 107.565 113.145 118.136 124.116 128.299
100	67.328 70.065 74.222 77.929 82.358 118.498 124.342 129.561 135.807 140.169

大學

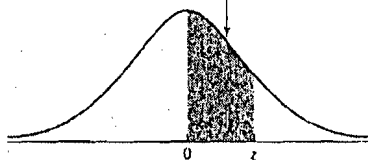


$\alpha$ :	0.10	0.05	0.025	0.01	0.005
d.f. = 1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.710	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
31	1.309	1.696	2.040	2.453	2.744
32	1.309	1.694	2.037	2.449	2.738
33	1.308	1.692	2.035	2.445	2.733
34	1.307	1.691	2.032	2.441	2.728
35	1.306	1.690	2.030	2.438	2.724
36	1.306	1.688	2.028	2.435	2.719
37	1.305	1.687	2.026	2.431	2.715
38	1.304	1.686	2.024	2.429	2.712
39	1.304	1.685	2.023	2.426	2.708
40	1.303	1.684	2.021	2.423	2.704
41	1.303	1.683	2.020	2.421	2.701
42	1.302	1.682	2.018	2.418	2.698
43	1.302	1.681	2.017	2.416	2.695
44	1.301	1.680	2.015	2.414	2.692
45	1.301	1.679	2.014	2.412	2.690

中國文化大學



t Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990

Z Table

中國文化大學

