國立中央大學八十七學年度碩士班研究生入學試題卷

所別：資訊管理研究所 甲乙組 科目：統計學 共 2 頁 第 1 頁

一、宿舍之自動販賣機經營者擬調查學生對 Pepsi 與 Coca 兩種可樂的喜好程度。共有 64 位學生參與此次之市場調查，結果有 39 位學生偏好 Coca，有 25 位學生偏好 Pepsi.。請問，這個樣本資料是否顯示出顯著之偏好差異？($\alpha = 0.05$，雙尾檢定)(8 %)

二、有一份共 48 題的單選選擇題試卷，每題有四個選項，請問學生須至少答對幾題，才能顯著看出該學生成績不是隨意猜中得來的。($\alpha = 0.05$，單尾檢定) (7 %)

三、下表是一個二因子 ANOVA 統計表，是取自一個實驗，主要在探討上課教室大小，及測驗教室大小對學生學習成效之影響。請計算並在下表的 (a), (b), (c), (d) 及 (e)處填入適當數值，再根據 ANOVA 統計表說明本實驗之結果。($\alpha = 0.05$) (15 %)

Source	SS	df	MS	F
A (lecture room)	5	1	5	(a)
B(testing room)	5	1	5	(b)
A*B	845	1	845	(c)
Error	146	(d)	(e)	
Total	1001	19		

四、Each new employee of a company is required to take an aptitude test administered by the personnel department. The maximum score is 40, and the test covers basic English and math skills. A sample of 14 test scores produces the following values:

17 25 18 33 35 14 35

17 24 23 38 28 31 37.

(1) Treating these values as raw data, compute the mean and the standard deviation. (5%)

(2) Find the coefficient of variation for this sample. What does this coefficient mean to you? (5%)

(3) Suppose the manager of the personnel department reported in a company memo that the average score for all new employees who started on or after January 1 of the current calendar year is 21.6, with a standard deviation of 24.9. Is this reasonable? Why or why not? (5%)

五、A random sample of ten students on the Ideal University were asked their grade point averages (GPA) and the number of hours per week, outside of class, the spent studying. The results are shown in the following table.

GPA	study hours
80	25
83	22
75	9
78	15
81	15
89	30
77	20
79	30
56	10
65	18

(a) Estimate the linear regression of grade point average on study time. (5%)

(b) What effect would you expect an increase of one hour per week in study time to have on grade point average? (5%)

(c) What does the p-value mean to you in the hypothesis testing whether the study time linearly influences GPA in this study? (5%)

注意：背面有試題

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六、What should one do when he/she discovers the significant difference between various means by the ANOVA test and it is necessary to rank these different means for research purposes? (10%)

七、A personnel director wants to know if the mean length of employment in years with the company is about the same for assembly and clerical workers. A sample 35 employees was randomly drawn from each of these two groups of workers. Conduct a test of hypothesis to determine if there is a significant difference in the mean length of employment with the company for the two groups. Use a significance level of 0.05. (10%)

Assembly workers: $n = 35$, $\bar{x} = 4.1$, $s^2 = 30.2$.

Clerical workers: $n = 35$, $\bar{x} = 3.2$, $s^2 = 28.1$

八、(a)試說明判定係數(Coefficient of Determination) R^2和相關係數(Coefficient of Correlation) r的意義。(5%)

(b)試說明 R^2是否越大越好?爲什麼。(5%)

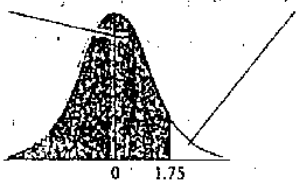
九、請列舉三個實例(不同型態)說明卡方檢定(chi-square test)可處理的問題。(10%)

Standard Normal Distribution

The cumulative standardized normal distribution $F(z)$ is defined by

$$F(z) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-x^2/2}\,dx$$

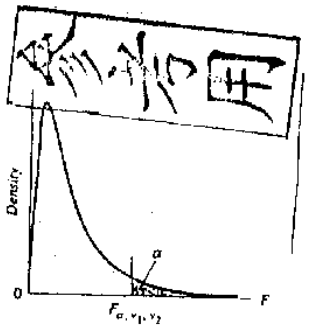
Example $P(z \le 1.75) = F(1.75) = 0.9599$ $P(z \ge 1.75) = 0.0401$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

F Distribution Values

F Values When α = .05



ν_2 \ ν_1	1	2	3	4	5
1	161.45	199.50	215.71	224.58	230.16
2	18.513	19.000	19.164	19.247	19.296
3	10.128	9.5521	9.2766	9.1172	9.0135
4	7.7086	6.9443	6.5914	6.3883	6.2560
5	6.6079	5.7861	5.4095	5.1922	5.0503
6	5.9874	5.1433	4.7571	4.5337	4.3874
7	5.5914	4.7374	4.3468	4.1203	3.9715
8	5.3177	4.4590	4.0662	3.8378	3.6875
9	5.1174	4.2565	3.8626	3.6331	3.4817
10	4.9646	4.1028	3.7083	3.4780	3.3258
11	4.8443	3.9823	3.5874	3.3567	3.2039
12	4.7472	3.8853	3.4903	3.2592	3.1059
13	4.6672	3.8056	3.4105	3.1791	3.0254
14	4.6001	3.7389	3.3439	3.1122	2.9582
15	4.5431	3.6823	3.2874	3.0556	2.9013
16	4.4940	3.6337	3.2389	3.0069	2.8524
17	4.4513	3.5915	3.1968	2.9647	2.8100
18	4.4139	3.5546	3.1599	2.9277	2.7729
19	4.3808	3.5219	3.1274	2.8951	2.7401
20	4.3513	3.4928	3.0984	2.8661	2.7109
21	4.3248	3.4668	3.0725	2.8401	2.6848
22	4.3009	3.4434	3.0491	2.8167	2.6613
23	4.2793	3.4221	3.0280	2.7955	2.6400
24	4.2597	3.4028	3.0088	2.7763	2.6207
25	4.2417	3.3852	2.9912	2.7587	2.6030
26	4.2252	3.3690	2.9751	2.7426	2.5868
27	4.2100	3.3541	2.9604	2.7278	2.5719
28	4.1960	3.3404	2.9467	2.7141	2.5581
29	4.1830	3.3277	2.9340	2.7014	2.5454
30	4.1709	3.3158	2.9223	2.6896	2.5336
40	4.0848	3.2317	2.8387	2.6060	2.4495
60	4.0012	3.1504	2.7581	2.5252	2.3683
120	3.9201	3.0718	2.6802	2.4472	2.2900
∞	3.8415	2.9957	2.6049	2.3719	2.2141

Note: For example, if $\alpha = .05$, $\nu_1 = 4$, and $\nu_2 = 7$, then $F_{\alpha,\nu_1,\nu_2} = F_{.05,4,7} = 4.1203$, where ν_1 is the numerator degrees of freedom and ν_2 is the denominator degrees of freedom.

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