國立中央大學九十一學年度碩士班研究生入學試題卷

所別：資訊管理學系第2成組　科目：統計學　共 2 頁 第 1 頁

1. 投擲兩個正四面體各面分別標示 1,2,3,4，X表示兩個正四面體向下的那一面中數字較小者，Y表示兩個正四面體向下的那一面的數字中為奇數者的個數，試問：(16%)
   (1) 列出X，Y的聯合機率分配表；
   (2) 計算 E(X)，Var(X)；
   (3) 計算 E(Y)，Var(Y)；
   (4) Covariance of X，Y=？

2. 某噴霧殺蟲劑製造商，擬比較兩種新殺蟲液1與2的功效，他準備了兩間等大的空房間來做實驗，每一房間內均放置了 1000 隻蒼蠅。測試結果發現 1 號殺蟲液可以殺死 825 隻蒼蠅，而 2 號殺蟲液則殺死了 760 隻蒼蠅。試推估上述測試環境中，兩種殺蟲液的殺蟲率差。(8%)

3. 某傢具工廠的裝配員上午與下午各工作 4 小時，該工廠的領班想知道下午裝配員的裝配速度是否較慢；已知他所帶領的 8 位裝配員當天的裝配件數如下：(16%)

	1	2	3	4	5	6	7	8
上午	24	28	30	27	29	31	22	25
下午	21	27	28	27	30	33	20	22

假設裝配員的件數呈常態分配。
   (1) 在$\alpha=0.05$之下，檢定裝配員下午的裝配速度是否較慢？
   (2) 試求上、下午裝配件數差標準偏差的 95%信賴區間。
   (3) 試求每天裝配件數標準偏差的 95%信賴區間。
   (4) 該領班宣稱其手下的裝配員每位每天平均至少裝配 60 件產品，在$\alpha=0.05$之下，檢定該領班的宣稱是否正確？若不正確，試求每位裝配員每天平均產量的 95%一端信賴區間。

4. 一個有關三種不同包裝設計（處理）的消費者愛好研究在四家商店（區集）中做隨機區集設計之試驗，其數據如下表所示，為每種包裝在每家商店中一星期的銷售量。此資料是否提供了充分的證據，足以說明每種包裝設計（處理）的平均銷售量有所差異？是否足以證明每家平均銷售量存有差異？(在$\alpha=0.05$之下)　(10%)

商店 1	商店 2	商店 3	商店 4
A：17	C：21	A：1	B：22
C：23	A：15	B：23	A：6
B：34	B：26	C：8	C：16

不同商店中A、B、C包裝設計的單位銷售數量

5. (a) What is the difference between a probability distribution and a sampling distribution? (20%)
   (b) What distinguishes the four potential sources of error when dealing with surveys designed using probability sampling?
   (c) What are the distinguishing features of the completely randomized design, randomized block design, and two-factor factorial designs?
   (d) What is meant by the concept of interaction in a two-factor factorial design?

6. Calculate the power of test for the following test of hypothesis, given that $\mu = 203$. (10%)

   $H_0: \mu = 200$

   $H_1: \mu > 200$

   $\alpha = 0.05, \sigma = 10, n = 100$

參考用

注意：背面有試題

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7. A large brokerage firm wants to determine whether the service it provides to affluent clients differs from the service it provides to lower-income clients. A sample of 500 clients are selected, and each client is asked to rate his or her broker. The results are shown in following Table. Test to determine whether there is evidence that broker rating and customer income are independent. Use $\alpha = 0.10$. (10%)

		Client's Income			
		Under $30000	$30000-$60000	Over $60000	Totals
Broker Rating	Outstanding	48	64	41	153
	Average	98	120	50	268
	Poor	30	33	16	79
		176	217	107	500

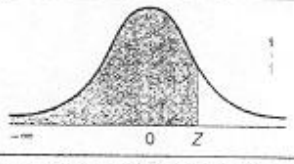
8 Suppose that you have obtained the following multiple regression equation:

$\hat{Y}i = 10 + 5\,X1i + 3\,X2i$ and $R^2 = 0.60$ (10%)

(a) Interpret the meaning of the slopes and the meaning of the Y intercept.

(b) Interpret the meaning of the coefficient of multiple determination R^2.

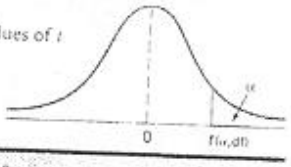
The Cumulative Standardized Normal Distribution



Entry represents area under the cumulative standardized normal distribution from $-\infty$ to Z

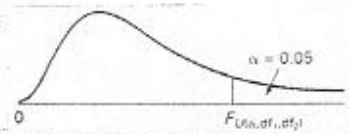
Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7518	0.7549
0.7	0.7580	0.7612	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952

Critical Values of t



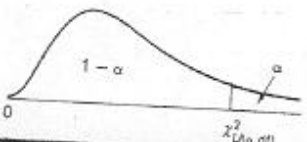
Degrees of Freedom	UPPER-TAIL AREAS: 0.10	0.05	0.025	0.01	0.005
1	3.0777	6.3138	12.7062	31.8207	63.6574
2	1.8856	2.9200	4.3027	6.9646	9.9248
3	1.6377	2.3534	3.1824	4.5407	5.8409
4	1.5332	2.1318	2.7764	3.7469	4.6041
5	1.4759	2.0150	2.5706	3.3649	4.0322
6	1.4398	1.9432	2.4469	3.1427	3.7074
7	1.4149	1.8946	2.3646	2.9980	3.4995
8	1.3968	1.8595	2.3060	2.8965	3.3554
9	1.3830	1.8331	2.2622	2.8214	3.2498
10	1.3722	1.8125	2.2281	2.7638	3.1693
11	1.3634	1.7959	2.2010	2.7181	3.1058
12	1.3562	1.7823	2.1788	2.6810	3.0545
13	1.3502	1.7709	2.1604	2.6503	3.0123
14	1.3450	1.7613	2.1448	2.6245	2.9768
15	1.3406	1.7531	2.1315	2.6025	2.9467

Critical Values of F



Denominator df_2	NUMERATOR df_1: 1	2	3	4	5
1	161.40	199.50	215.70	224.60	230.20
2	18.51	19.00	19.16	19.25	19.30
3	10.13	9.55	9.28	9.12	9.01
4	7.71	6.94	6.59	6.39	6.26
5	6.61	5.79	5.41	5.19	5.05
6	5.99	5.14	4.76	4.53	4.39
7	5.59	4.74	4.35	4.12	3.97
8	5.32	4.46	4.07	3.84	3.69
9	5.12	4.26	3.86	3.63	3.48
10	4.96	4.10	3.71	3.48	3.33
11	4.84	3.98	3.59	3.36	3.20
12	4.75	3.89	3.49	3.26	3.11
13	4.67	3.81	3.41	3.18	3.03
14	4.60	3.74	3.34	3.11	2.96

Critical Values of χ^2



Degrees of Freedom	UPPER-TAIL AREAS: 0.975	0.95	0.90	0.10	0.05	0.025
1	0.001	0.004	0.016	2.706	3.841	5.024
2	0.051	0.103	0.211	4.605	5.991	7.378
3	0.216	0.352	0.584	6.251	7.815	9.348
4	0.484	0.711	1.064	7.779	9.488	11.143
5	0.831	1.145	1.610	9.236	11.071	12.833
6	1.237	1.635	2.204	10.645	12.592	14.449
7	1.690	2.167	2.833	12.017	14.067	16.013
8	2.180	2.733	3.490	13.362	15.507	17.535
9	2.700	3.325	4.168	14.684	16.919	19.023
10	3.247	3.940	4.865	15.987	18.307	20.483
11	3.816	4.575	5.578	17.275	19.675	21.920
12	4.404	5.226	6.304	18.549	21.026	23.337
13	5.009	5.892	7.042	19.812	22.362	24.736
14	5.629	6.571	7.790	21.064	23.685	26.119
15	6.262	7.261	8.547	22.307	24.996	27.488