

銘傳大學 95 學年度轉學生招生考試

應用統計資訊學系

7 月 26 日第三節

(第 / 頁共四頁)

統計學試題

(限用答案本作答)

***** 可使用掌上型計算器 *****
 ***** 請計算至小數以下第 3 位 *****
 ***** 所有檢定問題均假設 $\alpha = 0.05$ *****

題組一(15%) 名詞解釋

- (1) Central Limit Theorem
- (2) Chebychev Rule
- (3) Unbiased estimator

題組二(25%) A model team has three members (A, B and C) whose payments are the followings (unit: NT\$1000) – A:100, B:200 and C:150. The manager will organize two-days show of which one model is randomly assigned each day (with replacement)

- (1)(5%) What is the probability distribution of the payment
- (2)(8%) Describe the sampling process and write down the sampling distribution of the average payment
- (3)(6%) Evaluate the expected value and the variance of the average payment.
- (4)(6%) If the show extends to 36 days, evaluate the probability that the average payment is greater than 155 (unit: NT\$1000).

題組三(35%) 某食品公司行銷部，設計了 2 種食品包裝 (A、B)，分別在全國北、中、南 3 區域之便利商店，販售一星期，記錄其銷售量 (單位：包)；下表為相關的資料，(總平均數=66.309，總變異數=111.515)

北區		中區		南區	
包裝	銷售量	包裝	銷售量	包裝	銷售量
A	45	A	42	A	43
A	58	A	45	A	54
A	60	A	51	A	66
A	65	A	63	A	68
A	69	A	67	A	69
B	67	B	69	A	70
B	69	B	70	B	71
B	71	B	71	B	73
B	72	B	75	B	75
B	73	B	78	B	77
B	74	平均數	63.1	B	78
B	76	變異數	160.3	B	80
平均數	66.6	樣本數	10	平均數	68.7
變異數	75.8			變異數	112.1
樣本數	12			樣本數	12

- (1)(9%) 製作「銷售區域」與「食品包裝」的列聯表(contingency table)；並說明食品包裝與銷售地區有無關聯性？
- (2)(10%) 依據全部 34 個銷售量，繪製莖葉圖(stem-and-leaf display)；並計算中位數，眾數
- (3)(8%) 比較北區、中區之平均銷售量，有無差異性？
- (4)(8%) 比較北區、中區、南區之平均銷售量，有無差異性？

(Hint: 已知 $\sum X_i^2 = 153172.8$, X_i : 銷售量)

本試題兩面印刷

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統計學試題

(限用答案本作答)

題組四(25%) 某醫院醫務室探討新生兒的體重，與母親懷孕前的體重的相關性。醫務室護士隨機訪問了 10 位產婦，得其懷孕前的體重(X，單位:公斤)及「新生兒體重」(Y，單位:公克)，下表為相關的資料

新生兒體重 Y	2722	3099	3651	2255	2600	2622	2637	2410	3370	2557
母親體重 X	43.1	59.1	66.7	46.8	48.6	52.3	53.6	54.5	49.9	47.7

已知 以下的總和

$$\sum x_i = 522.3, \sum y_i = 27923, \sum x_i y_i = 1475836,$$

$$\sum x_i^2 = 27695.3, \sum y_i^2 = 79719813$$

- (1) (7%) 寫出迴歸估計式，並說明迴歸斜率之意義。
- (2) (7%) 建立變異數分析表，並說明母親懷孕前的體重是否對新生兒的體重有影響？
- (3) (6%) 計算判定係數(coefficient of determination)，並加以解釋。
- (4) (5%) 若母親懷孕前的體重為 50 公斤，計算其新生兒體重在 95%信賴係數下之預測範圍。

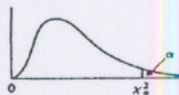
$$\text{Hint: } SS_{XY} = \sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y}); SS_{XX} = \sum_{i=1}^n (X_i - \bar{X})^2; SS_{YY} = \sum_{i=1}^n (Y_i - \bar{Y})^2$$

$$\hat{Y}_i = \hat{\beta}_0 + \hat{\beta}_1 X_i \quad \text{其中} \quad \hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}, \hat{\beta}_1 = SS_{XY} / SS_{XX}$$

$$SSE = SS_{YY} - \hat{\beta}_1 SS_{XY}$$

本試題兩面印刷

卡方分配附表



df	$\chi^2_{0.995}$	$\chi^2_{0.99}$	$\chi^2_{0.975}$	$\chi^2_{0.95}$	$\chi^2_{0.90}$	$\chi^2_{0.10}$	$\chi^2_{0.05}$	$\chi^2_{0.025}$	$\chi^2_{0.01}$	$\chi^2_{0.005}$	df
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879	1
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597	2
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838	3
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860	4
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750	5
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548	6
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278	7
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955	8
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589	9
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188	10
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757	11
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300	12
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819	13
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319	14
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801	15
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267	16
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718	17
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156	18
19	6.844	7.633	8.907	10.117	11.651	27.204	30.143	32.852	36.191	38.582	19

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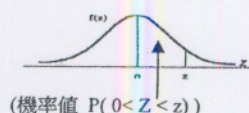
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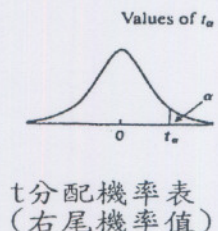
統計學試題

(限用答案本作答)

標準常態分配附表



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986



t 分配機率表 (右尾機率值)

df	t _{0.10}	t _{0.05}	t _{0.025}	t _{0.01}	t _{0.005}	df
5	1.476	2.015	2.571	3.365	4.032	5
6	1.440	1.943	2.447	3.143	3.707	6
7	1.415	1.895	2.365	2.998	3.499	7
8	1.397	1.860	2.306	2.896	3.355	8
9	1.383	1.833	2.262	2.821	3.250	9
10	1.372	1.812	2.228	2.764	3.169	10
11	1.363	1.796	2.201	2.718	3.106	11
12	1.356	1.782	2.179	2.681	3.055	12
13	1.350	1.771	2.160	2.650	3.012	13
14	1.345	1.761	2.145	2.624	2.977	14
15	1.341	1.753	2.131	2.602	2.947	15
16	1.337	1.746	2.120	2.583	2.921	16
17	1.333	1.740	2.110	2.567	2.898	17
18	1.330	1.734	2.101	2.552	2.878	18
19	1.328	1.729	2.093	2.539	2.861	19
20	1.325	1.725	2.086	2.528	2.845	20
21	1.323	1.721	2.080	2.518	2.831	21
22	1.321	1.717	2.074	2.508	2.819	22
23	1.319	1.714	2.069	2.500	2.807	23
24	1.318	1.711	2.064	2.492	2.797	24

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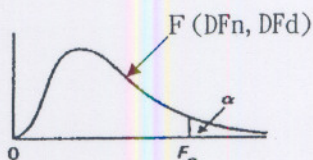
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統計學試題

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F 分配附表



DFd	α	DFn											
		1	2	3	4	5	6	7	8	9	10	11	12
6	0.1	3.776	3.463	3.289	3.181	3.108	3.055	3.014	2.983	2.958	2.937	2.920	2.905
	0.05	5.987	5.143	4.757	4.534	4.387	4.284	4.207	4.147	4.099	4.060	4.027	4.000
	0.025	8.813	7.260	6.599	6.227	5.988	5.820	5.695	5.600	5.523	5.461	5.410	5.366
	0.001	35.507	27.001	23.705	21.922	20.802	20.031	19.463	19.030	18.688	18.412	18.183	17.990
7	0.1	3.589	3.257	3.074	2.961	2.883	2.827	2.785	2.752	2.725	2.703	2.684	2.668
	0.05	5.591	4.737	4.347	4.120	3.972	3.866	3.787	3.726	3.677	3.637	3.603	3.575
	0.025	8.073	6.542	5.890	5.523	5.285	5.119	4.995	4.899	4.823	4.761	4.709	4.666
	0.001	29.246	21.690	18.772	17.197	16.207	15.520	15.018	14.634	14.330	14.083	13.879	13.708
8	0.1	3.458	3.113	2.924	2.806	2.726	2.668	2.624	2.589	2.561	2.538	2.519	2.502
	0.05	5.318	4.459	4.066	3.838	3.688	3.581	3.500	3.438	3.388	3.347	3.313	3.284
	0.025	7.571	6.059	5.416	5.053	4.817	4.652	4.529	4.433	4.357	4.295	4.243	4.200
	0.001	25.415	18.494	15.829	14.392	13.484	12.858	12.398	12.045	11.767	11.540	11.352	11.194
9	0.1	3.360	3.006	2.813	2.693	2.611	2.551	2.505	2.469	2.440	2.416	2.396	2.379
	0.05	5.117	4.256	3.863	3.633	3.482	3.374	3.293	3.230	3.179	3.137	3.102	3.073
	0.025	7.209	5.715	5.078	4.718	4.484	4.320	4.197	4.102	4.026	3.964	3.912	3.868
	0.001	22.857	16.387	13.901	12.560	11.714	11.129	10.697	10.368	10.106	9.894	9.719	9.570
10	0.1	3.285	2.924	2.728	2.605	2.522	2.461	2.414	2.377	2.347	2.323	2.302	2.284
	0.05	4.965	4.103	3.708	3.478	3.326	3.217	3.135	3.072	3.020	2.978	2.943	2.913
	0.025	6.937	5.456	4.826	4.468	4.236	4.072	3.950	3.855	3.779	3.717	3.665	3.621
	0.001	21.038	14.905	12.553	11.283	10.481	9.926	9.517	9.204	8.956	8.754	8.587	8.446
11	0.1	3.225	2.860	2.660	2.536	2.451	2.389	2.342	2.304	2.274	2.248	2.227	2.209
	0.05	4.844	3.982	3.587	3.357	3.204	3.095	3.012	2.948	2.896	2.854	2.818	2.788
	0.025	6.724	5.256	4.630	4.275	4.044	3.881	3.759	3.664	3.588	3.526	3.474	3.430
	0.001	19.687	13.812	11.561	10.346	9.579	9.047	8.655	8.355	8.116	7.923	7.762	7.625
12	0.1	3.177	2.807	2.606	2.480	2.394	2.331	2.283	2.245	2.214	2.188	2.166	2.147
	0.05	4.747	3.885	3.490	3.259	3.106	2.996	2.913	2.849	2.796	2.753	2.717	2.687
	0.025	6.554	5.096	4.474	4.121	3.891	3.728	3.607	3.512	3.436	3.374	3.321	3.277
	0.001	18.645	12.973	10.805	9.633	8.892	8.378	8.001	7.711	7.480	7.292	7.136	7.005
13	0.1	3.136	2.763	2.560	2.434	2.347	2.283	2.234	2.195	2.164	2.138	2.116	2.097
	0.05	4.667	3.806	3.411	3.179	3.025	2.915	2.832	2.767	2.714	2.671	2.635	2.604
	0.025	6.414	4.965	4.347	3.996	3.767	3.604	3.483	3.388	3.312	3.250	3.197	3.153
	0.001	17.815	12.313	10.209	9.073	8.355	7.856	7.489	7.206	6.982	6.799	6.647	6.519
14	0.1	3.102	2.726	2.522	2.395	2.307	2.243	2.193	2.154	2.122	2.095	2.073	2.054
	0.05	4.600	3.739	3.344	3.112	2.958	2.848	2.764	2.699	2.646	2.602	2.565	2.534
	0.025	6.298	4.857	4.242	3.892	3.663	3.501	3.380	3.285	3.209	3.147	3.095	3.050
	0.001	17.142	11.779	9.730	8.622	7.922	7.436	7.078	6.802	6.583	6.404	6.256	6.130
30	0.1	2.881	2.489	2.276	2.142	2.049	1.980	1.927	1.884	1.849	1.819	1.794	1.773
	0.05	4.171	3.316	2.922	2.690	2.534	2.421	2.334	2.266	2.211	2.165	2.126	2.092
	0.025	5.568	4.182	3.589	3.250	3.026	2.867	2.746	2.651	2.575	2.511	2.458	2.412
	0.001	13.293	8.773	7.054	6.125	5.534	5.122	4.817	4.582	4.393	4.239	4.110	4.001
31	0.1	2.875	2.482	2.270	2.136	2.042	1.973	1.920	1.877	1.842	1.812	1.787	1.765
	0.05	4.160	3.305	2.911	2.679	2.523	2.409	2.323	2.255	2.199	2.153	2.114	2.080
	0.025	5.549	4.165	3.573	3.234	3.010	2.851	2.730	2.635	2.558	2.495	2.442	2.396
	0.001	13.202	8.704	6.993	6.067	5.480	5.070	4.766	4.531	4.344	4.190	4.062	3.953
32	0.1	2.869	2.477	2.263	2.129	2.036	1.967	1.913	1.870	1.835	1.805	1.780	1.758
	0.05	4.149	3.295	2.901	2.668	2.512	2.399	2.313	2.244	2.189	2.142	2.103	2.070
	0.025	5.531	4.149	3.557	3.218	2.995	2.836	2.715	2.620	2.543	2.480	2.426	2.381
	0.001	13.117	8.638	6.936	6.014	5.429	5.021	4.718	4.485	4.298	4.145	4.017	3.908
33	0.1	2.864	2.471	2.258	2.123	2.030	1.961	1.907	1.864	1.828	1.799	1.773	1.751
	0.05	4.139	3.285	2.892	2.659	2.503	2.389	2.303	2.235	2.179	2.133	2.093	2.060
	0.025	5.515	4.134	3.543	3.204	2.981	2.822	2.701	2.606	2.529	2.466	2.412	2.366
	0.001	13.039	8.578	6.883	5.965	5.382	4.976	4.674	4.442	4.255	4.103	3.975	3.867
34	0.1	2.859	2.466	2.252	2.118	2.024	1.955	1.901	1.858	1.822	1.793	1.767	1.745
	0.05	4.130	3.276	2.883	2.650	2.494	2.380	2.294	2.225	2.170	2.123	2.084	2.050
	0.025	5.499	4.120	3.529	3.191	2.968	2.808	2.688	2.593	2.516	2.453	2.399	2.353
	0.001	12.966	8.522	6.833	5.919	5.339	4.934	4.633	4.401	4.215	4.063	3.936	3.828