東吳大學 106 學年度碩士班研究生招生考試試題

系級	國際經營與貿易學系碩士班	考試時間	100 分鐘
科目	統計學	本科總分	100 分

A. 嚴格要求每一次計算，請計算到小數第 3 位，四捨五入到第 2 位，然後再計算其他數字，例如樣本變異數分子平方和相加求到小數第 2 位，再除以自由度到第 2 位.....

B. 請列出計算過程，沒有計算過程最多只有配分分數的一半

C. 不可用手機與工程用計算器

1.請根據其定義，利用**文字**與**圖形**解釋下面名詞，文字與圖形缺一者最多只能拿到一半分數。**20%**

（1）sampling distribution-抽樣分配

（2）Central Limit Theorem-中央極限定理

（3）sampling error-抽樣誤差

（4）type I error-型 I 錯誤

（5）confidence coefficient-信賴係數

2. The below contains the amount that a sample of fifteen customers spent for lunch ($) at a fast-food restaurant: **10%**

7.42	6.29	5.83	6.50	8.34	9.51	7.10
6.80	4.89	6.50	5.52	7.90	8.30	9.60
5.90						

(1).At the 0.05 level of significance, is there evident that the mean amount spent for lunch is different from $6.50?

(2).What assumption must you make about the population distribution in order to conduct hypothesis testing? Why?

3. Asurvey conducted in the previous year indicated that 75% of adults wanted Internet access so they could check personal email while on vacation. Of 2000 adults, 1540 said that thy wanted Internet access so they could check personal email on vacation. Is there evident that the percentage of adults who wanted Internet access to check personal email while on vacation has changed from the previous year? And tell us what p value is. You can choose α from 0.05 and 0.01 by yourself. **10%**

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4. Filling in the below blanks (1)-(6). **(10%)**

Data	
Null Hypothesis μ=	**368**
Level of Significance	**0.05**
Population Standard Deviation	**15**
Sample Size	**25**
Sample Mean	**372.5**

Intermediate Calculations	
Standard Error of the Mean	(1)
***Z* Test Statistic**	**(2)**

Two-Tail Test	
Lower Critical Value	**(3)**
Upper Critical Value	**(4)**
***p*-Value**	**(5)**
Conclusion	**(6)**

5. The below data contains the overall miles per gallon (MPG) of 2012 family sedans: **10%**

38	24	26	21	25	22	24	34
23	20	37	22	20	33	22	21

(1) Construct a 90% confidence interval estimate for the population mean MPG of 2012 family sedans, assuming a normal distribution.

(2) Interpret the interval constructed in (a).

6. You want to have 95% confidence of estimating the proportion of office workers who respond to email within an hour to within ± 0.05. Because you have not previously undertaken such a study, there is no information available from past data. Determine the sample size needed. **10%**

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7. The automated production line at the Oxford Cereals main plant fills thousands of boxes of cereal during each shift. Those boxes should contain a mean of 368 grams of cereals. (1) If you randomly select a sample of 25 boxes without replacement from thousands of boxes during a shift, the sample contains much less than 5% of the population. Given that the standard deviation of cereal-filing process is 15 grams, compute the standard error of the mean. (2) What is the probability that the sample mean is below 365 grams? (3) Find an interval symmetrically distributed around the population mean that will include 90% of the sample means. **15%**

8. Answer (1) to (7). **15%**

摘要輸出

迴歸統計	
R	(1)
R 平方	(2)
調整後 R 平方	(3)
標準誤	(4)
觀察值個數	100

ANOVA

	自由度	SS	MS	F	顯著值
迴歸	1	2.5759	2.5759	(5)	0.0522
殘差	98	65.3424	0.6668		
總和	99	67.9183			

	係數	標準誤	t 統計	P-值	下限 95%	上限 95%
截距	1.9533	0.0817	23.9203	0.0000	1.7912	2.1153
廣告量	(6)	0.0783	1.9655	(7)	-0.3092	0.0015

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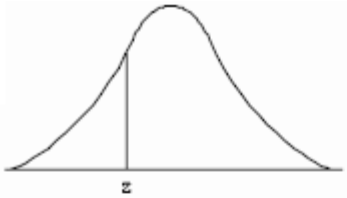

$$\phi(t) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2} dz = P(Z \le z)$$

z	0	1	2	3	4	5	6	7	8	9
-3.0	.0013	.0010	.0007	.0005	.0003	.0002	.0002	.0001	.0001	.0000
-2.9	.0019	.0018	.0017	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0126	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0238	.0233
-1.8	.0359	.0352	.0344	.0336	.0329	.0322	.0314	.0307	.0300	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0570	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0722	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-.7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
-.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

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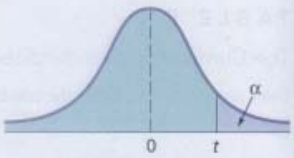
TABLE E.3

Critical Values of t

For a particular number of degrees of freedom, entry represents the critical value of t corresponding to the cumulative probability $(1 - \alpha)$ and a specified upper-tail area (α).



Degrees of Freedom	Cumulative Probabilities: 0.75	0.90	0.95	0.975	0.99	0.995
	Upper-Tail Areas: 0.25	0.10	0.05	0.025	0.01	0.005
1	1.0000	3.0777	6.3138	12.7062	31.8207	63.6574
2	0.8165	1.8856	2.9200	4.3027	6.9646	9.9248
3	0.7649	1.6377	2.3534	3.1824	4.5407	5.8409
4	0.7407	1.5332	2.1318	2.7764	3.7469	4.6041
5	0.7267	1.4759	2.0150	2.5706	3.3649	4.0322
6	0.7176	1.4398	1.9432	2.4469	3.1427	3.7074
7	0.7111	1.4149	1.8946	2.3646	2.9980	3.4995
8	0.7064	1.3968	1.8595	2.3060	2.8965	3.3554
9	0.7027	1.3830	1.8331	2.2622	2.8214	3.2498
10	0.6998	1.3722	1.8125	2.2281	2.7638	3.1693
11	0.6974	1.3634	1.7959	2.2010	2.7181	3.1058
12	0.6955	1.3562	1.7823	2.1788	2.6810	3.0545
13	0.6938	1.3502	1.7709	2.1604	2.6503	3.0123
14	0.6924	1.3450	1.7613	2.1448	2.6245	2.9768
15	0.6912	1.3406	1.7531	2.1315	2.6025	2.9467
16	0.6901	1.3368	1.7459	2.1199	2.5835	2.9208
17	0.6892	1.3334	1.7396	2.1098	2.5669	2.8982
18	0.6884	1.3304	1.7341	2.1009	2.5524	2.8784
19	0.6876	1.3277	1.7291	2.0930	2.5395	2.8609
20	0.6870	1.3253	1.7247	2.0860	2.5280	2.8453
21	0.6864	1.3232	1.7207	2.0796	2.5177	2.8314
22	0.6858	1.3212	1.7171	2.0739	2.5083	2.8188
23	0.6853	1.3195	1.7139	2.0687	2.4999	2.8073
24	0.6848	1.3178	1.7109	2.0639	2.4922	2.7969
25	0.6844	1.3163	1.7081	2.0595	2.4851	2.7874
26	0.6840	1.3150	1.7056	2.0555	2.4786	2.7787
27	0.6837	1.3137	1.7033	2.0518	2.4727	2.7707
28	0.6834	1.3125	1.7011	2.0484	2.4671	2.7633
29	0.6830	1.3114	1.6991	2.0452	2.4620	2.7564
30	0.6828	1.3104	1.6973	2.0423	2.4573	2.7500
31	0.6825	1.3095	1.6955	2.0395	2.4528	2.7440
32	0.6822	1.3086	1.6939	2.0369	2.4487	2.7385
33	0.6820	1.3077	1.6924	2.0345	2.4448	2.7333
34	0.6818	1.3070	1.6909	2.0322	2.4411	2.7284
35	0.6816	1.3062	1.6896	2.0301	2.4377	2.7238
36	0.6814	1.3055	1.6883	2.0281	2.4345	2.7195
37	0.6812	1.3049	1.6871	2.0262	2.4314	2.7154
38	0.6810	1.3042	1.6860	2.0244	2.4286	2.7116
39	0.6808	1.3036	1.6849	2.0227	2.4258	2.7079
40	0.6807	1.3031	1.6839	2.0211	2.4233	2.7045
41	0.6805	1.3025	1.6829	2.0195	2.4208	2.7012
42	0.6804	1.3020	1.6820	2.0181	2.4185	2.6981
43	0.6802	1.3016	1.6811	2.0167	2.4163	2.6951
44	0.6801	1.3011	1.6802	2.0154	2.4141	2.6923
45	0.6800	1.3006	1.6794	2.0141	2.4121	2.6896
46	0.6799	1.3002	1.6787	2.0129	2.4102	2.6870
47	0.6797	1.2998	1.6779	2.0117	2.4083	2.6846
48	0.6796	1.2994	1.6772	2.0106	2.4066	2.6822
49	0.6795	1.2991	1.6766	2.0096	2.4049	2.6800
50	0.6794	1.2987	1.6759	2.0086	2.4033	2.6778