

國立臺北科技大學 101 學年度碩士班招生考試

系所組別：4300 資訊與運籌管理研究所

第二節 統計學 試題

第一頁 共三頁

注意事項：

1. 本試題共七題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。
4. 每題均須附詳細計算過程，否則不予計分。
5. 相關機率分配表格附於試題之後。

1. The students at NTUT spent an average of 15.3 hours per week logged on to the Internet while at home. Assume the amount of time is normally distributed and that the standard deviation is 3.94 hours.

- (a) What is the probability a randomly selected group of students spent fewer than 10 hours on the Internet? (5%)
- (b) What percentage of students spent more than 20 hours on the Internet? (5%)
- (c) A student is classified as a heavy user if he or she is in the upper 20% of usage. How many hours must a student have logged on to the Internet to be considered as a heavy user? (10%)

2. Forty-nine percent of students at NTUT have smart phones. Use a population proportion $p = 0.49$ and assume that a sample of 300 students will be selected.

- (a) Show the sampling distribution of \bar{p} , where \bar{p} is the sample proportion of students that have smart phones. (5%) What theorem is your answer based on? (5%)
- (b) What is the probability that the sample proportion will be within ± 0.3 of the population proportion? (5%)

3. A government survey found that households tend to spend an average of NT\$17576 during Chinese New Year. Assume that the survey included 600 households and the standard deviation was NT\$4740.

- (a) With 95% confidence interval, what is the margin of error? (5%)
- (b) What is the 90% confidence interval estimate of the population mean? (5%)

4. In a survey, 200 NTUT students were asked about their major source of news information; 110 of them stated that their major source was Internet news.

- (a) Conduct a 95% confidence interval for the proportion of students in the population who consider Internet as their major source of news information. (5%)
- (b) How large a sample would be necessary to estimate the population proportion with a margin of error of 0.05 at 95% confidence? (5%)

5. Five years ago, the average size of farms in Taiwan was 160 acres. From a recent survey of 27 farms, the mean and standard deviation were found to be 180 and 36 acres, respectively.

- (a) Is there strong evidence that the average farm size is larger than what it was 5 years ago? Test at 95% confidence level (show your test hypotheses and compute test statistic) and report the P -value. (10%)
- (b) Give a 98% confidence interval for the current average size. (5%)

6. A group of 140 NTUT students participated in an experiment to compare two teaching methods. Method 1 is given to 78 students selected at random, and the remaining 62 are given Method 2. The means and standard deviations of the responses are

	Method 1	Method 2
Mean	92	118
Standard Deviation	46.2	53.4

- (a) Determine a 98% confidence interval for the mean difference of the two methods. (5%)
- (b) Suppose the university wishes to establish that Method 2 has a higher mean response than Method 1. Perform the test at 95% confidence level (show your test hypotheses and compute test statistic) and report the P -value. (10%)

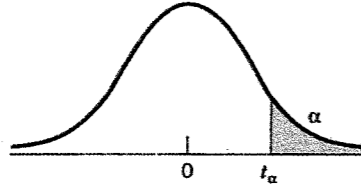
7. A local dealer provides the following used-car prices, with age x measured in years and price y measured in thousands of dollars.

x	1	2	2	4	4	5	7	7	8
y	16.9	12.9	13.9	13.0	8.8	8.9	5.6	5.7	6.0

- (a) Determine the equation of the least squares regression line. (10%)
- (b) Construct a 95% confidence interval for the slope of the regression line. (5%)

注意：背面尚有參考資料

TABLE 4 Percentage Points of *t* Distributions



d.f. \ α	.25	.10	.05	.025	.01	.00833	.00625	.005
1	1.000	3.078	6.314	12.706	31.821	38.204	50.923	63.657
2	.816	1.886	2.920	4.303	6.965	7.649	8.860	9.925
3	.765	1.638	2.353	3.182	4.541	4.857	5.392	5.841
4	.741	1.533	2.132	2.776	3.747	3.961	4.315	4.604
5	.727	1.476	2.015	2.571	3.365	3.534	3.810	4.032
6	.718	1.440	1.943	2.447	3.143	3.287	3.521	3.707
7	.711	1.415	1.895	2.365	2.998	3.128	3.335	3.499
8	.706	1.397	1.860	2.306	2.896	3.016	3.206	3.355
9	.703	1.383	1.833	2.262	2.821	2.933	3.111	3.250
10	.700	1.372	1.812	2.228	2.764	2.870	3.038	3.169
11	.697	1.363	1.796	2.201	2.718	2.820	2.981	3.106
12	.695	1.356	1.782	2.179	2.681	2.779	2.934	3.055
13	.694	1.350	1.771	2.160	2.650	2.746	2.896	3.012
14	.692	1.345	1.761	2.145	2.624	2.718	2.864	2.977
15	.691	1.341	1.753	2.131	2.602	2.694	2.837	2.947
16	.690	1.337	1.746	2.120	2.583	2.673	2.813	2.921
17	.689	1.333	1.740	2.110	2.567	2.655	2.793	2.898
18	.688	1.330	1.734	2.101	2.552	2.639	2.775	2.878
19	.688	1.328	1.729	2.093	2.539	2.625	2.759	2.861
20	.687	1.325	1.725	2.086	2.528	2.613	2.744	2.845
21	.686	1.323	1.721	2.080	2.518	2.601	2.732	2.831
22	.686	1.321	1.717	2.074	2.508	2.591	2.720	2.819
23	.685	1.319	1.714	2.069	2.500	2.582	2.710	2.807
24	.685	1.318	1.711	2.064	2.492	2.574	2.700	2.797
25	.684	1.316	1.708	2.060	2.485	2.566	2.692	2.787
26	.684	1.315	1.706	2.056	2.479	2.559	2.684	2.779
27	.684	1.314	1.703	2.052	2.473	2.552	2.676	2.771
28	.683	1.313	1.701	2.048	2.467	2.546	2.669	2.763
29	.683	1.311	1.699	2.045	2.462	2.541	2.663	2.756
30	.683	1.310	1.697	2.042	2.457	2.536	2.657	2.750
40	.681	1.303	1.684	2.021	2.423	2.499	2.616	2.704
60	.679	1.296	1.671	2.000	2.390	2.463	2.575	2.660
120	.677	1.289	1.658	1.980	2.358	2.428	2.536	2.617
∞	.674	1.282	1.645	1.960	2.326	2.394	2.498	2.576

