淡江大學 95 學年度碩士班招生考試試題

系別：國際貿易學系　　　　　科目：統　計　學

准帶項目請打「v」	
V	簡單型計算機

本試題共 2 頁 —1

本試題雙面印製

1) Please explain the following terms:
   a) The Central Limit Theorem (中央極限定理). (10%)
   b) Chebyshev's Inequality (謝比雪夫不等式). (5%)
   c) The empirical rule (經驗法則). (5%)

2) A fair die is labelled with two faces showing a 1, two faces showing a 2, and two faces showing a 3. The die is tossed twice, and X_1 = the number on the top of the die on the first toss, X_2 = the number on the top of the die on the second toss.
   a) Find $E[X_1]$ and $E[X_2]$. (6%)
   b) Find the distribution of $Y = X_1 + X_2$, and compute $E[Y]$. (6%)
   c) Are X_1 and X_2 independent? Why? (8%)

3) A manufacturer of robots develops two new models, but for production economy wishes to market only one of them. He chooses at random 400 users and randomly divides them into two groups of 200 each ($n_1 = n_2 = 200$). Each group uses one model for a week and then responds to the question "Would you prefer this robot to the one you now use?" The results are:

Robot	Yes	No	Total
Model 1	68 (y_1)	132 ($n - y_1$)	200 ($n = n_1$)
Model 2	52 (y_2)	148 ($n - y_2$)	200 ($n = n_2$)
Total	120 ($y_1 + y_2$)	280 ($2n - y_1 - y_2$)	400 ($n_1 + n_2$)

Based on these results, can the manufacturer decide which model to market? (Given significance level $\alpha = 0.05$) (20%)

4) Two independent random samples of 15 men and 15 women, newly graduated from a university, gave the following data on annual salaries for their first job.

Sample	Sample mean	Sample standard deviation
Men	$11228	$1386
Women	$8697	$1161

   a) Find a 95% confidence interval for the difference $\mu_1 - \mu_2$ in mean income for newly graduated men and women. (10%)
   b) Test the hypothesis that new men graduates make more than new women graduates, at the level of significance $\alpha = 0.05$.
      i) State the null and alternative hypotheses. (5%)
      ii) What conclusion would you reach? (5%)

5) The following data give the U.S. divorce rate per 1000 population for 1890 – 1970 (National Center for Health Statistics):

Year (x)	1890	1900	1910	1920	1930	1940	1950	1960	1970
Divorce rate (y)	0.5	0.7	0.9	1.6	1.6	2.0	2.6	2.2	3.5

   a) Plot the scattergram for these data. Does it look linear? (10%)
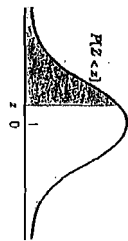   b) Find the Least Squares line equation. (10%)

◀ 注意背面爲有試題▶

系別：國際貿易學系　　　　　科目：統　計　學

TABLE　Standard Normal Probabilities

$P(Z < z)$

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.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	.0125	.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	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.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	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.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
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

TABLE　Percentage Points of t Distributions
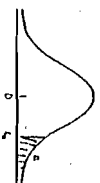
d.f.	.25	.10	.05	.025	.01	.00833	.00625	.005
1	1.000	3.078	6.314	12.706	31.821	38.204	50.923	63.657
2	0.816	1.886	2.920	4.303	6.965	7.649	8.860	9.925
3	0.765	1.638	2.353	3.182	4.541	4.857	5.392	5.841
4	0.741	1.533	2.132	2.776	3.747	3.961	4.315	4.604
5	0.727	1.476	2.015	2.571	3.365	3.534	3.810	4.032
6	0.718	1.440	1.943	2.447	3.143	3.287	3.521	3.707
7	0.711	1.415	1.895	2.365	2.998	3.128	3.335	3.499
8	0.706	1.397	1.860	2.306	2.896	3.016	3.206	3.355
9	0.703	1.383	1.833	2.262	2.821	2.933	3.111	3.250
10	0.700	1.372	1.812	2.228	2.764	2.870	3.038	3.169
11	0.697	1.363	1.796	2.201	2.718	2.820	2.981	3.106
12	0.695	1.356	1.782	2.179	2.681	2.779	2.934	3.055
13	0.694	1.350	1.771	2.160	2.650	2.746	2.896	3.012
14	0.692	1.345	1.761	2.145	2.624	2.718	2.864	2.977
15	0.691	1.341	1.753	2.131	2.602	2.694	2.837	2.947
16	0.690	1.337	1.746	2.120	2.583	2.673	2.813	2.921
17	0.689	1.333	1.740	2.110	2.567	2.655	2.793	2.898
18	0.688	1.330	1.734	2.101	2.552	2.639	2.775	2.878
19	0.688	1.328	1.729	2.093	2.539	2.625	2.759	2.861
20	0.687	1.325	1.725	2.086	2.528	2.613	2.744	2.845
21	0.686	1.323	1.721	2.080	2.518	2.601	2.732	2.831
22	0.686	1.321	1.717	2.074	2.508	2.591	2.720	2.819
23	0.685	1.319	1.714	2.069	2.500	2.582	2.710	2.807
24	0.685	1.318	1.711	2.064	2.492	2.574	2.700	2.797
25	0.684	1.316	1.708	2.060	2.485	2.566	2.692	2.787
26	0.684	1.315	1.706	2.056	2.479	2.559	2.684	2.779
27	0.684	1.314	1.703	2.052	2.473	2.552	2.676	2.771
28	0.683	1.313	1.701	2.048	2.467	2.546	2.669	2.763
29	0.683	1.311	1.699	2.045	2.462	2.541	2.663	2.756
30	0.683	1.310	1.697	2.042	2.457	2.536	2.657	2.750
40	0.681	1.303	1.684	2.021	2.423	2.499	2.616	2.704
60	0.679	1.296	1.671	2.000	2.390	2.463	2.575	2.660
120	0.677	1.289	1.658	1.980	2.358	2.428	2.536	2.617
∞	0.674	1.282	1.645	1.960	2.326	2.394	2.495	2.576

系別：國際貿易學系　　　　　科目：統　計　學