

國立臺北大學 108 學年度碩士班一般入學考試試題

系（所）組別：財政學系
科 目：統計學

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Notes: Please round to the nearest hundredths (the 2nd decimal) in your calculation. In making statistical inferences, clearly specify the hypothesis, test statistics, decision rules, and the conclusions derived from your tests. If needed, use the most appropriate table to find the critical values.

- I. (10%) A client is interested in a portfolio consisting of investments in the World Stock Index Fund (WSI) and the Taiwan Government Bond Fund (TGB). WSI is composed of global stocks with good dividend yields. The average percent return of an investment in the WSI is 7.80% with a standard deviation of 18.90%. The average percent return of an investment in TGB is 5.50% and the standard deviation is 4.60%. The covariance of an investment in the WSI with an investment in the TGB is -12.4.
- (a) Which of the funds would be considered the riskier one? Explain your answers.
- (b) Suppose you recommend that the client invests 75% in the WSI and 25% in the TGB. If the client decides to invest in NT\$10,000 in this portfolio, what would be the expected return and standard deviation, in dollars, for the client's investment?
- II. (15%) A news article reports that, according to their survey, consumers spend, on average, NT\$3000 per month on soft drinks. The article states that the standard error of the mean is \$20. Suppose the population standard deviation is \$500.
- (a) How large was the sample used in the study?
- (b) What is the probability that the point estimate was within ± 25 of the population mean?
- III. (15%) A recent study estimates that an average smoker spends \$1,873 per month on cigarette. Suppose the study is based on interviews with 80 persons and that the sample standard deviation is \$550.
- (a) What is the 95% confidence interval for the population mean amount spent on cigarette?
- (b) If the amount spent on cigarette is skewed to the right, what would you expect the median amount spent on cigarette compared to the mean?
- IV. (20%) Suppose, in a poll of 910 adults, 503 respondents reported that they were optimistic about the national outlook. The Press Secretary claims that this poll indicates that the majority of adults are optimistic about the nation's outlook. Conduct a hypothesis test using the p-value approach and use $\alpha = 0.05$ for the level of significance to test the Press Secretary's statement.

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- V. (20%) A teacher wants to investigate whether the distance (kilometers) between home and school for the students affect the number of days that students are absent per semester. Here is the output of the regression table estimated by the researcher:

Coefficients:

	Estimate	Std. Error	t value
(Intercept)	8.09783	0.80882	10.012
x	-0.34420	0.07761	-4.435

Analysis of Variance

SOURCE	DF	SS	MS	F	p-value
Regression	1	32.699	32.699	19.67	0.002
Residual Error	8	13.301	1.663		
Total	9	46.000			

- (a) Use *days* to denote the number of days that students are absent and use *distance* to denote the distance between student's home and school. What is the least squares regression model estimated by the researcher? What is the sample size?
- (b) Is there a significant relationship between the two variables? Use $\alpha = 0.05$ for the level of significance.
- (c) Did the estimated regression provide a good fit? Explain your answer.
- (d) Develop a 95% confidence interval for the slope of the regression.

- VI. (20%) A financial adviser wants to compare the mutual fund performance between two countries. 30 mutual funds from each country were randomly selected and the annual return for the funds were collected for the analysis. The descriptive statistics of the two samples are shown below:

	COUNTRY A	COUNTRY B
SAMPLE SIZE	30	30
SAMPLE MEAN	16.23	15.70
STANDARD DEVIATION	3.52	3.31

Conduct a hypothesis test to test whether the mutual funds from Country A have a higher annual return than the mutual funds from Country B. At the 0.05 level of significance, what is your conclusion? You may use reasonable approximations in your calculation.

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Table 1: Standard Normal Probability Table

Entries in the table show the upper tail probability, i.e., $\Pr(z \geq Z)$

Z	+0	+0.01	+0.02	+0.03	+0.04	+0.05	+0.06	+0.07	+0.08	+0.09
0	0.50000	0.49601	0.49202	0.48803	0.48405	0.48006	0.47608	0.47210	0.46812	0.46414
0.1	0.46020	0.45620	0.45224	0.44828	0.44433	0.44034	0.43640	0.43251	0.42858	0.42465
0.2	0.42070	0.41683	0.41294	0.40905	0.40517	0.40129	0.39743	0.39358	0.38974	0.38591
0.3	0.38209	0.37828	0.37448	0.37070	0.36693	0.36317	0.35942	0.35569	0.35197	0.34827
0.4	0.34458	0.34090	0.33724	0.33360	0.32997	0.32636	0.32276	0.31918	0.31561	0.31207
0.5	0.30854	0.30503	0.30153	0.29806	0.29460	0.29116	0.28774	0.28434	0.28096	0.27760
0.6	0.27425	0.27093	0.26763	0.26435	0.26109	0.25785	0.25463	0.25143	0.24825	0.24510
0.7	0.24196	0.23885	0.23576	0.23270	0.22965	0.22663	0.22363	0.22065	0.21770	0.21476
0.8	0.21186	0.20897	0.20611	0.20327	0.20045	0.19766	0.19489	0.19215	0.18943	0.18673
0.9	0.18406	0.18141	0.17879	0.17619	0.17361	0.17106	0.16853	0.16602	0.16354	0.16109
1.0	0.15866	0.15625	0.15386	0.15151	0.14917	0.14686	0.14457	0.14231	0.14007	0.13786
1.1	0.13567	0.13350	0.13136	0.12924	0.12714	0.12507	0.12302	0.12100	0.11900	0.11702
1.2	0.11507	0.11314	0.11123	0.10935	0.10749	0.10565	0.10383	0.10204	0.10027	0.09853
1.3	0.09680	0.09510	0.09342	0.09176	0.09012	0.08851	0.08692	0.08534	0.08379	0.08226
1.4	0.08076	0.07927	0.07780	0.07636	0.07493	0.07353	0.07215	0.07078	0.06944	0.06811
1.5	0.06681	0.06552	0.06426	0.06301	0.06178	0.06057	0.05938	0.05821	0.05705	0.05592
1.6	0.05480	0.05370	0.05262	0.05155	0.05050	0.04947	0.04846	0.04746	0.04648	0.04551
1.7	0.04457	0.04363	0.04272	0.04182	0.04093	0.04006	0.03920	0.03836	0.03754	0.03673
1.8	0.03593	0.03515	0.03438	0.03362	0.03288	0.03216	0.03144	0.03074	0.03005	0.02938
1.9	0.02872	0.02807	0.02743	0.02680	0.02619	0.02559	0.02500	0.02442	0.02385	0.02330
2.0	0.02275	0.02222	0.02169	0.02118	0.02068	0.02018	0.01970	0.01923	0.01876	0.01831
2.1	0.01786	0.01743	0.01700	0.01659	0.01618	0.01578	0.01539	0.01500	0.01463	0.01426
2.2	0.01390	0.01355	0.01321	0.01287	0.01255	0.01222	0.01191	0.01160	0.01130	0.01101
2.3	0.01072	0.01044	0.01017	0.00990	0.00964	0.00939	0.00914	0.00889	0.00866	0.00842
2.4	0.00820	0.00798	0.00776	0.00755	0.00734	0.00714	0.00695	0.00676	0.00657	0.00639
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100

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Table 2: Student's t-distribution table

Entries in the table give t_x values, where x is the probability in the upper tail of the t -distribution

Degrees of Freedom	Upper Tail Probability x					
	0.2	0.1	0.05	0.025	0.01	0.005
1	1.376	3.078	6.314	12.706	31.821	63.657
2	1.061	1.886	2.920	4.303	6.965	9.925
3	0.978	1.638	2.353	3.182	4.541	5.841
4	0.941	1.533	2.132	2.776	3.747	4.604
5	0.920	1.476	2.015	2.571	3.365	4.032
6	0.906	1.440	1.943	2.447	3.143	3.707
7	0.896	1.415	1.895	2.365	2.998	3.499
8	0.889	1.397	1.860	2.306	2.896	3.355
9	0.883	1.383	1.833	2.262	2.821	3.250
10	0.879	1.372	1.812	2.228	2.764	3.169
11	0.876	1.363	1.796	2.201	2.718	3.106
12	0.873	1.356	1.782	2.179	2.681	3.055
13	0.870	1.350	1.771	2.160	2.650	3.012
14	0.868	1.345	1.761	2.145	2.624	2.977
15	0.866	1.341	1.753	2.131	2.602	2.947
16	0.865	1.337	1.746	2.120	2.583	2.921
17	0.863	1.333	1.740	2.110	2.567	2.898
18	0.862	1.330	1.734	2.101	2.552	2.878
19	0.861	1.328	1.729	2.093	2.539	2.861
20	0.860	1.325	1.725	2.086	2.528	2.845
21	0.859	1.323	1.721	2.080	2.518	2.831
22	0.858	1.321	1.717	2.074	2.508	2.819
23	0.858	1.319	1.714	2.069	2.500	2.807
24	0.857	1.318	1.711	2.064	2.492	2.797
25	0.856	1.316	1.708	2.060	2.485	2.787
26	0.856	1.315	1.706	2.056	2.479	2.779
27	0.855	1.314	1.703	2.052	2.473	2.771
28	0.855	1.313	1.701	2.048	2.467	2.763
29	0.854	1.311	1.699	2.045	2.462	2.756
30	0.854	1.310	1.697	2.042	2.457	2.750
40	0.851	1.303	1.684	2.021	2.423	2.704
50	0.849	1.299	1.676	2.009	2.403	2.678
60	0.848	1.296	1.671	2.000	2.390	2.660
80	0.846	1.292	1.664	1.990	2.374	2.639
100	0.845	1.290	1.660	1.984	2.364	2.626
120	0.845	1.289	1.658	1.980	2.358	2.617
∞	0.842	1.282	1.645	1.960	2.326	2.576

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