

東吳大學 104 學年度碩士班研究生招生考試試題

第 1 頁，共 5 頁

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

1. 請解釋信賴水準(confidence level)與顯著水準(significance level)。(10%)
2. 請解釋型一錯誤(type I error)與型二錯誤(type II error)，並圖示。(10%)
3. 請說明集群隨機抽樣(cluster random sampling)與分層隨機抽樣(stratified random sampling)最主要的不同之處。(10%)
4. 請解釋母體(population)與樣本(sample)、參數(parameter)與統計量(statistic)、抽樣(sampling)與推論(inference)，並說明或圖示之間的關係。(10%)
5. The following frequency distribution reports the number of frequent flier miles, reported in thousands, for employees of Soochow Statistical Consulting Inc. during the most recent quarter. (10%)

Frequent flier Miles	Numbers of employees
0 up to 3	5
3 up to 6	12
6 up to 9	23
9 up to 12	8
12 up to 15	2
total	50

- a. What is the midpoint of the first class?
- b. Construct a histogram.
- c. Construct a frequency polygon.
- d. Construct the cumulative percentage polygon.
- e. Calculate its mean and variance.

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

Summary

Regression Statistics	
Multiple R	__(10)___
R Square	__(1)___
Adjusted R Square	__(2)___
Standard Error	__(3)___
Observations	474

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ANOVA

	df	SS	MS	F	significance F
Regression	3	35.1818	__(4)__	__(5)__	0.0000
Residual	470	__(6)__	0.0505		
Total	473	58.9133			

	coefficients	S.E.	t-stat	p value
Intercept	__(7)__	0.0832	107.5383	0.0000
Female	-0.2863	0.1083	__(8)__	0.0085
Educational years	0.0416	__(9)__	6.3001	0.0000
Female*Educational year	0.0408	0.0081	5.0265	0.0000

7. Four supermarket chains in the Denver area each claim to have the lowest overall prices. As part of an investigative study on supermarket advertising, the *Denver Daily News* conducted a study. First, a random sample of five grocery items was selected. Next, the price of each selected item was checked at each the four chains on the same day. Is there a difference in the mean prices at the supermarkets or for the items at the significance level of .05? Please construct a ANOVA summary table. (15%)

Item	Supermarkets			
	Super	Ralph's	Welcome	Costco
1	\$18	17	22	21
2	16	23	22	23
3	21	21	22	26
4	23	22	25	29
5	25	24	28	28

8. The following data on annual rates of return were collected from five stocks listed on the NYSE and six stocks on NASDAQ. At the .05 significance level, can we conclude that the population variances are the same and the annual rates of return are higher on the NYSE? (10%)

NYSE	NASDAQ
3	2
7	4
5	9
8	3
4	2
3	

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9. The production department of Soochow International wants to explore the relationship between the number of employees who assemble a subassembly and the number produced. As an example, twenty employees were assigned to assemble the subassemblies. They produced thirty during a one-hour period. Then forty employees assembled them. They produced sixty during a one-hour period. The complete set of pair observations follows.

Number of assemblers	One-hour production(units)
20	30
40	60
20	40
30	60
10	30
10	40
20	40
20	50
20	30
30	70

The dependent variable is production; this is, it is assumed that different levels of production result from a different number of employees. (10%)

- (1) Draw a scatter diagram.
- (2) Determine the regression equation.
- (3) Determine the production when employee is 25.

10. The null hypothesis and alternate are: (5%)

H_0 : The frequencies are equal.

H_1 : The frequencies are not equal.

Category	frequency
A	10
B	20
C	30
D	20

- (1) How to test this hypothesis?
- (2) What is the test statistic?

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t-distribution

Confidence Intervals, <i>c</i>							Confidence Intervals, <i>c</i>						
df	80%	90%	95%	98%	99%	99.9%	df	80%	90%	95%	98%	99%	99.9%
	Level of Significance for One-Tailed Test, α							Level of Significance for One-Tailed Test, α					
	0.10	0.05	0.025	0.01	0.005	0.0005		0.10	0.05	0.025	0.01	0.005	0.0005
	Level of Significance for Two-Tailed Test, α							Level of Significance for Two-Tailed Test, α					
	0.20	0.10	0.05	0.02	0.01	0.001		0.20	0.10	0.05	0.02	0.01	0.001
1	3.078	6.314	12.706	31.821	63.657	636.619	36	1.306	1.688	2.028	2.434	2.719	3.582
2	1.886	2.920	4.303	6.965	9.925	31.599	37	1.305	1.687	2.026	2.431	2.715	3.574
3	1.638	2.353	3.182	4.541	5.841	12.924	38	1.304	1.686	2.024	2.429	2.712	3.566
4	1.533	2.132	2.776	3.747	4.604	8.610	39	1.304	1.685	2.023	2.426	2.708	3.558
5	1.476	2.015	2.571	3.365	4.032	6.869	40	1.303	1.684	2.021	2.423	2.704	3.551
6	1.440	1.943	2.447	3.143	3.707	5.959	41	1.303	1.683	2.020	2.421	2.701	3.544
7	1.415	1.895	2.365	2.998	3.499	5.408	42	1.302	1.682	2.018	2.418	2.698	3.538
8	1.397	1.860	2.306	2.896	3.355	5.041	43	1.302	1.681	2.017	2.416	2.695	3.532
9	1.383	1.833	2.262	2.821	3.250	4.781	44	1.301	1.680	2.015	2.414	2.692	3.526
10	1.372	1.812	2.228	2.764	3.169	4.587	45	1.301	1.679	2.014	2.412	2.690	3.520
11	1.363	1.796	2.201	2.718	3.106	4.437	46	1.300	1.679	2.013	2.410	2.687	3.515
12	1.356	1.782	2.179	2.681	3.055	4.318	47	1.300	1.678	2.012	2.408	2.685	3.510
13	1.350	1.771	2.160	2.650	3.012	4.221	48	1.299	1.677	2.011	2.407	2.682	3.505
14	1.345	1.761	2.145	2.624	2.977	4.140	49	1.299	1.677	2.010	2.405	2.680	3.500
15	1.341	1.753	2.131	2.602	2.947	4.073	50	1.299	1.676	2.009	2.403	2.678	3.496
16	1.337	1.746	2.120	2.583	2.921	4.015	51	1.298	1.675	2.008	2.402	2.676	3.492
17	1.333	1.740	2.110	2.567	2.898	3.965	52	1.298	1.675	2.007	2.400	2.674	3.488
18	1.330	1.734	2.101	2.552	2.878	3.922	53	1.298	1.674	2.006	2.399	2.672	3.484
19	1.328	1.729	2.093	2.539	2.861	3.883	54	1.297	1.674	2.005	2.397	2.670	3.480
20	1.325	1.725	2.086	2.528	2.845	3.850	55	1.297	1.673	2.004	2.396	2.668	3.476
21	1.323	1.721	2.080	2.518	2.831	3.819	56	1.297	1.673	2.003	2.395	2.667	3.473
22	1.321	1.717	2.074	2.508	2.819	3.792	57	1.297	1.672	2.002	2.394	2.665	3.470
23	1.319	1.714	2.069	2.500	2.807	3.768	58	1.296	1.672	2.002	2.392	2.663	3.466
24	1.318	1.711	2.064	2.492	2.797	3.745	59	1.296	1.671	2.001	2.391	2.662	3.463
25	1.316	1.708	2.060	2.485	2.787	3.725	60	1.296	1.671	2.000	2.390	2.660	3.460
26	1.315	1.706	2.056	2.479	2.779	3.707	61	1.296	1.670	2.000	2.389	2.659	3.457
27	1.314	1.703	2.052	2.473	2.771	3.690	62	1.295	1.670	1.999	2.388	2.657	3.454
28	1.313	1.701	2.048	2.467	2.763	3.674	63	1.295	1.669	1.998	2.387	2.656	3.452
29	1.311	1.699	2.045	2.462	2.756	3.659	64	1.295	1.669	1.998	2.386	2.655	3.449
30	1.310	1.697	2.042	2.457	2.750	3.646	65	1.295	1.669	1.997	2.385	2.654	3.447
31	1.309	1.696	2.040	2.453	2.744	3.633	66	1.295	1.668	1.997	2.384	2.652	3.444
32	1.309	1.694	2.037	2.449	2.738	3.622	67	1.294	1.668	1.996	2.383	2.651	3.442
33	1.308	1.692	2.035	2.445	2.733	3.611	68	1.294	1.668	1.995	2.382	2.650	3.439
34	1.307	1.691	2.032	2.441	2.728	3.601	69	1.294	1.667	1.995	2.382	2.649	3.437
35	1.306	1.690	2.030	2.438	2.724	3.591	70	1.294	1.667	1.994	2.381	2.648	3.435

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B.4 Critical Values of the *F* Distribution at a 5 Percent Level of Significance



		Degrees of Freedom for the Numerator																
		1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	
Degrees of Freedom for the Denominator	1	161	200	216	225	230	234	237	239	241	242	244	246	248	249	250	251	
	2	18.5	19.0	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.5	19.5	19.5
	3	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.59
	4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.72
	5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.46
	6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.77
	7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.34
	8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.04
	9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.83
	10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.66
	11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.53
	12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.43
	13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.34
	14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.27
	15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.20
	16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.15
	17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.10
	18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.06
	19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	2.03
	20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.99
	21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.96
	22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.94
	23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.91
	24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.89
	25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.87
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.79	
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.69	
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.59	
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.50	
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.39	