

系所組：國際貿易學系碩士班一般生

日期節次：99 年 3 月 13 日第 2 節 11:00 -12:30

科目：統計學

請注意：未寫出計算式者不計分。請計算至小數點第二位，四捨五入。

一、以下是某一學校學生的隨機樣本之性別與年齡的交叉次數分配表。

年齡	性別		總數
	男性	女性	
18-19 歲	10	80	90
20-21 歲	20	70	90
22-23 歲	30	60	90
24-25 歲	40	50	90
總數	100	260	360

- (1) 請計算男性之平均年齡與變異數。(3分)
- (2) 男性與女性之年齡的變異程度，何者較大？(7分)
- (3) 若隨機從全部之 360 個學生中抽取一人，則此人為男生之機率？(3分)
- (4) 若隨機從全部之 360 個學生中抽取一人，若已知此人之年齡為 20-21 歲，則此人為男生之機率？(7分)
- (5) 請以 95%的信賴區間，檢定此一學校男性與女性之年齡是否有顯著之差異
 - A. 請寫出虛無假設與對立假設(5分)
 - B. 請寫出男性與女性之年齡差異的 95%信賴區間(15分)
 - C. 請說明你檢定之結果(10分)

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二.

Use $\alpha=0.05$ for the following hypothesis testing

16% (1) In a study of the effect of worker satisfaction with worker participation in managerial decision making, 100 workers were interviewed in each of two separate German manufacturing plants. One plant had active worker participation in managerial decision making; the other did not. Each selected worker was asked whether he or she generally approved of the managerial decisions made within the firm. The results of the interviews are shown in the accompanying table.

Response	Participative Decision making	No Participative Decision Making
Generally approve of the firm's decisions	73	51
Do not approve of the firm's decisions	27	49

8% (a) Do the data provide sufficient evidence to indicate that approval or disapproval of management's decisions depends on whether workers participate in decision making? Do the appropriate hypothesis testing.

8% (b) Do these data support the hypothesis that workers in a firm with participative decision making more generally approve of the firm's managerial decisions than those employed by firms without participative decision making? Use methods other than (a) above to test the hypothesis.

34% (2) An educator wished to study whether the number of years invested in schooling pays off in the job market. The table below gives the median annual income of full-time workers age 25 years or older by the number of years of schooling completed.

		Year of Schooling					
		8	10	12	14	16	19
Salary	Men	18	20.5	25	28.1	34.5	39.7
(thousand dollars)	Women	11.5	13	16.1	18.3	22.1	27.6

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7% (a) Find the least-squares prediction equation relating a man's salary y to the number of years of schooling x he has had.

8% (b) Do the data provide sufficient evidence to indicate that, with the straight-line linear model, x contributes information for the prediction of y ?

7% (c) Find a 95% confidence interval for the mean salary when a man has 18 years of schooling.

8% (d) Is there a significant positive correlation between the salaries of men and women?

4% (e) Compute and interpret the coefficient of determination.

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TABLE Critical Values of F



Table of F-distribution critical values for alpha=0.05. Columns represent numerator degrees of freedom (v1) and rows represent denominator degrees of freedom (v2). Values range from 161.4 to 1.00.

TABLE

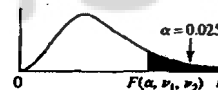


Table of F-distribution critical values for alpha=0.025. Columns represent numerator degrees of freedom (v1) and rows represent denominator degrees of freedom (v2). Values range from 647.8 to 1.00.

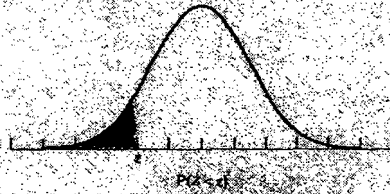
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TABLE 3 Standard Normal Table

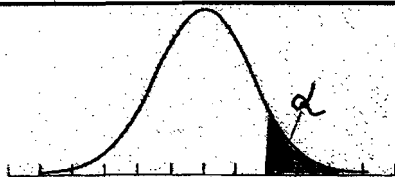


z	Second Decimal Place									
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-2.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-2.8	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
-2.7	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
-2.6	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
-2.5	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
-2.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
-2.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-2.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-2.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-2.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-1.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-1.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-1.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-1.6	0.0044	0.0043	0.0042	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036	0.0035
-1.5	0.0052	0.0051	0.0050	0.0049	0.0048	0.0047	0.0046	0.0045	0.0044	0.0043
-1.4	0.0060	0.0059	0.0058	0.0057	0.0056	0.0055	0.0054	0.0053	0.0052	0.0051
-1.3	0.0069	0.0068	0.0067	0.0066	0.0065	0.0064	0.0063	0.0062	0.0061	0.0060
-1.2	0.0078	0.0077	0.0076	0.0075	0.0074	0.0073	0.0072	0.0071	0.0070	0.0069
-1.1	0.0088	0.0087	0.0086	0.0085	0.0084	0.0083	0.0082	0.0081	0.0080	0.0079
-1.0	0.0098	0.0097	0.0096	0.0095	0.0094	0.0093	0.0092	0.0091	0.0090	0.0089
-0.9	0.0109	0.0108	0.0107	0.0106	0.0105	0.0104	0.0103	0.0102	0.0101	0.0100
-0.8	0.0120	0.0119	0.0118	0.0117	0.0116	0.0115	0.0114	0.0113	0.0112	0.0111
-0.7	0.0131	0.0130	0.0129	0.0128	0.0127	0.0126	0.0125	0.0124	0.0123	0.0122
-0.6	0.0143	0.0142	0.0141	0.0140	0.0139	0.0138	0.0137	0.0136	0.0135	0.0134
-0.5	0.0155	0.0154	0.0153	0.0152	0.0151	0.0150	0.0149	0.0148	0.0147	0.0146
-0.4	0.0168	0.0167	0.0166	0.0165	0.0164	0.0163	0.0162	0.0161	0.0160	0.0159
-0.3	0.0180	0.0179	0.0178	0.0177	0.0176	0.0175	0.0174	0.0173	0.0172	0.0171
-0.2	0.0192	0.0191	0.0190	0.0189	0.0188	0.0187	0.0186	0.0185	0.0184	0.0183
-0.1	0.0204	0.0203	0.0202	0.0201	0.0200	0.0199	0.0198	0.0197	0.0196	0.0195
0.0	0.5000	0.4980	0.4960	0.4940	0.4920	0.4901	0.4881	0.4861	0.4841	0.4821

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TABLE 4 t Critical Values



Degrees of Freedom	Upper Tail Probability (α)								
	0.15	0.10	0.05	0.025	0.015	0.01	0.005	0.001	0.0005
1	1.963	3.078	6.314	12.706	21.205	31.821	63.657	318.309	1273.155
2	1.386	1.886	2.920	4.303	5.643	6.965	9.925	22.327	44.703
3	1.250	1.638	2.353	3.182	3.896	4.541	5.841	10.215	16.326
4	1.190	1.533	2.132	2.776	3.298	3.747	4.604	7.173	10.305
5	1.156	1.476	2.015	2.571	3.003	3.365	4.032	5.893	7.976
6	1.134	1.440	1.943	2.447	2.829	3.143	3.707	5.208	6.788
7	1.119	1.415	1.895	2.365	2.715	2.998	3.499	4.785	6.082
8	1.108	1.397	1.860	2.306	2.634	2.896	3.355	4.501	5.617
9	1.100	1.383	1.833	2.262	2.574	2.821	3.250	4.297	5.291
10	1.093	1.372	1.812	2.228	2.527	2.764	3.169	4.144	5.049
11	1.088	1.363	1.796	2.201	2.491	2.718	3.106	4.025	4.863
12	1.083	1.356	1.782	2.179	2.461	2.681	3.055	3.930	4.717
13	1.079	1.350	1.771	2.160	2.436	2.650	3.012	3.852	4.597
14	1.076	1.345	1.761	2.145	2.415	2.625	2.977	3.787	4.499
15	1.074	1.341	1.753	2.131	2.397	2.602	2.947	3.733	4.417
16	1.071	1.337	1.746	2.120	2.382	2.583	2.921	3.686	4.346
17	1.069	1.333	1.740	2.110	2.368	2.567	2.898	3.646	4.286
18	1.067	1.330	1.734	2.101	2.356	2.552	2.878	3.611	4.233
19	1.066	1.328	1.729	2.093	2.346	2.539	2.861	3.579	4.187
20	1.064	1.325	1.725	2.086	2.336	2.528	2.845	3.552	4.146
21	1.063	1.323	1.721	2.080	2.328	2.518	2.831	3.527	4.109
22	1.061	1.321	1.717	2.074	2.320	2.508	2.819	3.505	4.077
23	1.060	1.319	1.714	2.069	2.313	2.500	2.807	3.485	4.047
24	1.059	1.318	1.711	2.064	2.307	2.492	2.797	3.467	4.021
25	1.058	1.316	1.708	2.060	2.301	2.485	2.787	3.450	3.997
26	1.058	1.315	1.706	2.056	2.296	2.479	2.779	3.435	3.974
27	1.057	1.314	1.703	2.052	2.291	2.473	2.771	3.421	3.954
28	1.056	1.313	1.701	2.048	2.286	2.467	2.763	3.408	3.935
29	1.055	1.311	1.699	2.045	2.282	2.462	2.756	3.396	3.918
30	1.055	1.310	1.697	2.042	2.278	2.457	2.750	3.385	3.902
40	1.050	1.303	1.684	2.021	2.250	2.423	2.704	3.307	3.788
50	1.047	1.299	1.676	2.009	2.234	2.403	2.678	3.261	3.723
60	1.045	1.296	1.671	2.000	2.223	2.390	2.660	3.232	3.681
128	1.041	1.289	1.658	1.980	2.196	2.358	2.617	3.160	3.578
Z critical value	1.036	1.282	1.645	1.960	2.170	2.326	2.576	3.090	3.290
Level of Significance for a one-tailed test	0.15	0.10	0.05	0.025	0.015	0.01	0.005	0.001	0.0005
Level of Significance for a two-tailed test	0.30	0.20	0.10	0.05	0.03	0.02	0.01	0.002	0.001

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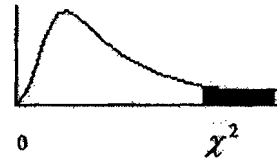
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附表 卡方分配表



自由度	卡方分配底下之右尾面積									
	.995	.990	.975	.950	.900	.100	.050	.025	.010	.005
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.878
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.186	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.083	24.769	27.587	30.191	33.409	35.718
18	6.265	7.018	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.587
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.330
30	13.787	14.953	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.58	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169

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