

考試科目	系所組別	考試時間	月	日	星期	上午	下午	第	節																																																																																																				
<p>1. 以下 100 筆資料乃自常態分配 $N(\mu, \sigma^2)$ 抽出的隨機樣本：</p> <table style="margin: auto; border-collapse: collapse;"> <tr><td>28.9</td><td>60.6</td><td>66.0</td><td>73.9</td><td>82.0</td></tr> <tr><td>39.7</td><td>60.8</td><td>67.0</td><td>73.9</td><td>82.7</td></tr> <tr><td>48.0</td><td>61.2</td><td>68.8</td><td>74.7</td><td>82.7</td></tr> <tr><td>49.4</td><td>61.4</td><td>69.0</td><td>74.9</td><td>83.2</td></tr> <tr><td>50.0</td><td>62.1</td><td>69.6</td><td>74.9</td><td>83.6</td></tr> <tr><td>50.7</td><td>62.2</td><td>69.6</td><td>75.2</td><td>85.0</td></tr> <tr><td>54.5</td><td>62.4</td><td>69.8</td><td>75.9</td><td>86.0</td></tr> <tr><td>54.9</td><td>62.5</td><td>69.9</td><td>76.0</td><td>86.6</td></tr> <tr><td>55.3</td><td>62.8</td><td>70.9</td><td>76.7</td><td>86.8</td></tr> <tr><td>55.4</td><td>63.9</td><td>70.9</td><td>76.7</td><td>87.1</td></tr> <tr><td>55.6</td><td>64.3</td><td>71.0</td><td>77.1</td><td>87.8</td></tr> <tr><td>56.0</td><td>64.6</td><td>71.2</td><td>78.0</td><td>88.8</td></tr> <tr><td>56.0</td><td>64.7</td><td>71.6</td><td>78.1</td><td>89.3</td></tr> <tr><td>56.6</td><td>64.7</td><td>71.7</td><td>78.4</td><td>91.6</td></tr> <tr><td>56.8</td><td>65.1</td><td>72.0</td><td>78.9</td><td>92.0</td></tr> <tr><td>56.9</td><td>65.1</td><td>72.2</td><td>79.1</td><td>93.8</td></tr> <tr><td>58.1</td><td>65.2</td><td>72.4</td><td>80.5</td><td>93.9</td></tr> <tr><td>58.7</td><td>65.2</td><td>72.5</td><td>80.6</td><td>94.1</td></tr> <tr><td>58.7</td><td>65.5</td><td>72.6</td><td>80.9</td><td>98.2</td></tr> <tr><td>60.5</td><td>65.6</td><td>72.8</td><td>81.0</td><td>103.1</td></tr> </table> <p>(a) 在不借助於樣本平均數及樣本變異數的計算，估計期望值 μ、變異數 σ^2 的數值。(6%)</p> <p>(b) 由你/妳從(a)估計出的期望值及變異數，驗證這 100 筆資料是否服從常態分配。(6%)</p> <p>2. 假設台北市民有 0.1% 患有肝癌。經由某種血液篩選的檢查，肝癌患者有 99% 被歸類為陽性反應，但非肝癌患者也有 1% 被歸類為陽性反應。</p> <p>(a) 若某甲被測出陽性反應，則某甲實際上有肝癌的機會為何？(4%)</p> <p>(b) 若某甲被測出陽性反應後，他認為自己有肝癌的機會不大，因此又前往另一家醫院再作一次檢查，檢查結果還是陽性反應。請問經過兩次獨立的檢查，結果都是陽性反應，則某甲實際上有肝癌的機會又是為何？(4%)</p>										28.9	60.6	66.0	73.9	82.0	39.7	60.8	67.0	73.9	82.7	48.0	61.2	68.8	74.7	82.7	49.4	61.4	69.0	74.9	83.2	50.0	62.1	69.6	74.9	83.6	50.7	62.2	69.6	75.2	85.0	54.5	62.4	69.8	75.9	86.0	54.9	62.5	69.9	76.0	86.6	55.3	62.8	70.9	76.7	86.8	55.4	63.9	70.9	76.7	87.1	55.6	64.3	71.0	77.1	87.8	56.0	64.6	71.2	78.0	88.8	56.0	64.7	71.6	78.1	89.3	56.6	64.7	71.7	78.4	91.6	56.8	65.1	72.0	78.9	92.0	56.9	65.1	72.2	79.1	93.8	58.1	65.2	72.4	80.5	93.9	58.7	65.2	72.5	80.6	94.1	58.7	65.5	72.6	80.9	98.2	60.5	65.6	72.8	81.0	103.1
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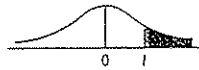
考試科目	系所組別	考試時間	月	日	上午	第	節
			星期		下		

master entrance 91 Dept of Statistics

- (20points) The manufacturer of a TV set wanted to know whether a 10 percent reduction in price is enough to increase the sales of their product. To investigate, the owner randomly selected 18 outlets and sold the TV sets at the reduced price at 9 of the outlets and regular price at the other 9 outlets. Reported below is the number of units sold last month at the selected outlets.

Regular price 138 121 88 115 141 125 96 104 121
 Reduced price 128 134 152 135 114 106 112 120 125

- (a) Are the samples independent or dependent ? (2 points)
 - (b) What are the H_0 and H_1 ? (4 points)
 - (c) At the 0.05 significance level, can the manufacturer conclude that the price reduction resulted in an increase in sales ? (4 points)
 - (d) Construct the 95% confidence interval. (2 points)
 - (e) Use a graph to indicate the area of the p -value. (2 points)
 - (f) Which of the following statements are true ? (6 points) (多選題)
- (1) p -value is the probability of obtaining a test statistic as extreme as, or more extreme than, the current observed statistic, when H_1 is true.
 - (2) The p -value can be interpreted as the smallest significance level at which we can reject H_0 .
 - (3) The probability that the population mean lies in the interval you obtained in part (d) is 0.95.



df	Level of Significance for One-Tailed Test					
	0.100	0.050	0.025	0.010	0.005	0.0005
	Level of Significance for Two-Tailed Test					
	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
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.924
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850

備 考 試 題 隨 卷 繳 交

命 題 委 員 : (簽 章) 年 月 日

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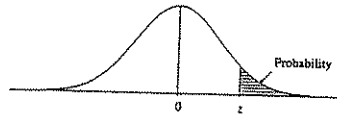
考試科目	系所組別	考試時間	月 日 星期	上午 下午 節
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The following hypothetical table refers to passengers in autos and light trucks involved in accidents in a town. The table classified passengers by whether they were wearing a seat belt and by whether they were injured or killed.

		Injury	
		Yes	No
Seat Belt	Yes	6	54
	No	8	32

- (7%) Test the hypothesis of independence. Find and interpret the p -value. What is your conclusion? (Use $\alpha = 0.05$)
- (7%) Test to see if there is any difference in the proportions of injury between passengers wearing seat belts and those not wearing them. State the null and alternative hypotheses. What is your conclusion? Are you surprised with the conclusion you have reached here? Why or why not? (Use $\alpha = 0.05$)
- (3%) Do you reach the same conclusion in (1) and (2)? Do they have to be the same? Explain.
- (3%) Estimate the difference of the proportions with 95% confidence.

TABLE A Normal curve tail probabilities. Standard normal probability in right-hand tail (for negative values of z , probabilities are found by symmetry)



z	Second Decimal Place of z									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0722	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0352	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
2.9	.0019	.0018	.0017	.0017	.0016	.0016	.0015	.0015	.0014	.0014
3.0	.00135									
3.5	.000233									

備 考 試 題 隨 卷 繳 交

命 題 委 員 員 名 單 (簽 章) 年 月 日

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Problem. In an experiment to see whether the amount of coverage of light blue interior latex paint depended either on the brand of paint or on the brand of roller used, 0.1 gallon of each of four brands of paint was applied using each of three brands of roller, resulting in the following data (number of square feet covered).

Roller brand

Paint brand	Roller brand			Mean
	1	2	3	
1	54	46	51	50.33
2	46	44	47	45.67
3	39	42	44	41.67
4	44	37	43	41.33
Mean	45.75	42.25	46.25	44.75

And with $\sum \sum y_{ij}^2 = 24,269$, $\bar{y}_{..} = 44.75$.

- State and test hypotheses appropriate for deciding whether paint brand and roller brand have any effect on coverage. Use $\alpha = 0.05$. (15 points)
- If the test on paint brand is rejected, can we conclude that paint brand 1 and 3 differ? Use the 95 percent level of confidence. (5 points)

F Distribution

Abcissa (horizontal axis) values for numerator degrees of freedom 1(10, 12, 15, 20, 24, 30, 40, 60, 120), denominator degrees of freedom 1(30, 40, 60, 120), for upper-tail area .05.

$v_1 \backslash v_2$	1	2	3	4	5	6	7	8	9
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
2	18.513	19.000	19.184	19.247	19.296	19.330	19.353	19.371	19.385
3	10.128	9.5521	9.2756	9.1172	9.0135	8.9406	8.8868	8.8452	8.8123
4	7.7086	6.9443	6.5914	6.3883	6.2550	6.1631	6.0942	6.0410	5.9988
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725
6	5.6974	4.8333	4.4337	4.2037	4.0539	3.9546	3.8806	3.8318	3.7909
7	5.0914	4.1974	3.7748	3.5348	3.3759	3.2770	3.2037	3.1567	3.1181
8	4.6177	3.6950	3.2522	2.9922	2.8254	2.7270	2.6546	2.6086	2.5714
9	4.2417	3.2889	2.8262	2.5462	2.3794	2.2810	2.2086	2.1626	2.1254
10	3.9346	2.9519	2.4692	2.1792	2.0124	1.9140	1.8416	1.7956	1.7584
11	3.6843	2.6712	2.1685	1.8685	1.7017	1.6033	1.5309	1.4849	1.4477
12	3.4742	2.4321	1.9094	1.6094	1.4426	1.3442	1.2718	1.2258	1.1886
13	3.2841	2.2120	1.6693	1.3693	1.2025	1.1041	1.0317	0.9857	0.9485
14	3.1140	2.0019	1.4382	1.1382	0.9714	0.8730	0.8006	0.7546	0.7174
15	2.9639	1.8418	1.2871	0.9871	0.8203	0.7219	0.6495	0.6035	0.5663
16	2.8238	1.7417	1.2060	0.9060	0.7392	0.6408	0.5684	0.5224	0.4852
17	2.6937	1.6516	1.1349	0.8349	0.6681	0.5697	0.4973	0.4513	0.4141
18	2.5736	1.5715	1.0738	0.7738	0.6070	0.5086	0.4362	0.3902	0.3530
19	2.4635	1.5014	1.0227	0.7227	0.5559	0.4575	0.3851	0.3391	0.3019
20	2.3634	1.4413	0.9816	0.6816	0.5148	0.4164	0.3440	0.2980	0.2608
21	2.2733	1.3912	0.9405	0.6405	0.4737	0.3753	0.3029	0.2569	0.2197
22	2.1932	1.3411	0.9094	0.6094	0.4426	0.3442	0.2718	0.2258	0.1886
23	2.1231	1.2910	0.8783	0.5783	0.4115	0.3131	0.2407	0.1947	0.1575
24	2.0630	1.2409	0.8472	0.5472	0.3804	0.2820	0.2096	0.1636	0.1264
25	2.0129	1.1908	0.8161	0.5161	0.3493	0.2509	0.1785	0.1325	0.0953
26	1.9628	1.1407	0.7850	0.4850	0.3182	0.2198	0.1474	0.1014	0.0642
27	1.9127	1.0906	0.7539	0.4539	0.2865	0.1881	0.1157	0.0697	0.0325
28	1.8626	1.0405	0.7228	0.4228	0.2548	0.1564	0.0840	0.0380	0.0008
29	1.8125	0.9904	0.6917	0.3917	0.2231	0.1247	0.0523	0.0063	—

Student t Distribution

Abcissa (horizontal axis) values for degrees of freedom 1(30, 40, 60, 120), for upper-tail areas .25, .1, .05, .025, .01, .005, .0025, .001, .0005.

v	0.25	0.1	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
1	1.000	3.078	6.314	12.706	31.821	63.657	127.32	318.31	638.62
2	0.915	1.888	2.920	4.303	6.965	9.925	14.089	22.328	31.598
3	0.787	1.638	2.353	3.182	5.411	7.453	10.213	16.994	23.682
4	0.741	1.533	2.132	2.776	4.747	6.604	9.148	14.017	19.448
5	0.727	1.476	2.015	2.571	4.385	6.023	8.151	12.493	17.000
6	0.718	1.440	1.943	2.447	4.143	5.707	7.621	11.345	15.492
7	0.711	1.415	1.895	2.365	3.982	5.491	7.289	10.591	14.548
8	0.706	1.397	1.860	2.306	3.851	5.319	7.000	10.000	13.816
9	0.703	1.383	1.833	2.262	3.747	5.181	6.800	9.700	13.280
10	0.700	1.372	1.812	2.228	3.658	5.081	6.626	9.500	12.900
11	0.697	1.363	1.796	2.201	3.585	4.996	6.466	9.333	12.583
12	0.695	1.356	1.782	2.179	3.521	4.923	6.318	9.183	12.316
13	0.694	1.350	1.771	2.160	3.462	4.859	6.180	9.041	12.083
14	0.692	1.345	1.761	2.145	3.407	4.796	6.050	8.900	11.866
15	0.691	1.341	1.753	2.131	3.355	4.733	5.933	8.766	11.658
16	0.690	1.337	1.746	2.120	3.305	4.670	5.826	8.633	11.458
17	0.689	1.333	1.740	2.110	3.259	4.607	5.721	8.500	11.266
18	0.688	1.330	1.734	2.101	3.215	4.544	5.621	8.366	11.083
19	0.688	1.328	1.729	2.093	3.172	4.481	5.526	8.233	10.900
20	0.687	1.325	1.725	2.086	3.130	4.418	5.426	8.100	10.725
21	0.686	1.323	1.721	2.080	3.088	4.355	5.326	7.966	10.550
22	0.686	1.321	1.717	2.074	3.047	4.292	5.226	7.833	10.375
23	0.685	1.319	1.714	2.069	3.006	4.229	5.126	7.700	10.200
24	0.685	1.318	1.711	2.064	2.965	4.166	5.026	7.566	10.025
25	0.684	1.316	1.708	2.060	2.924	4.103	4.926	7.433	9.850
26	0.684	1.315	1.706	2.056	2.883	4.040	4.826	7.300	9.675
27	0.684	1.314	1.703	2.052	2.842	3.977	4.726	7.166	9.500
28	0.683	1.313	1.701	2.048	2.801	3.914	4.626	7.033	9.325
29	0.683	1.311	1.699	2.045	2.760	3.851	4.526	6.900	9.150

備 考 試 題 隨 卷 繳 交

命 題 委 員 : _____ (簽 章) _____ 年 _____ 月 _____ 日

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考試科目		系所組別		考試時間	月 日 上午 第 節 星期 下												
<p>The following output of a multiple regression analysis is obtained.</p> <table style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="border-bottom: 1px solid black;">Predictor</th> <th style="border-bottom: 1px solid black;">Coef</th> <th style="border-bottom: 1px solid black;">StDev</th> </tr> </thead> <tbody> <tr> <td>Constant</td> <td>13.35</td> <td>4.71</td> </tr> <tr> <td>X_2</td> <td>-0.63</td> <td>0.23</td> </tr> <tr> <td>X_3</td> <td>1.42</td> <td>3.34</td> </tr> </tbody> </table> <p>There are 20 observations used in the model and we also obtain</p> $SSR = 350.25 \text{ and } SS_{Total} = 467.55 .$ <p>(1) (5%) Please complete the ANOVA table for the regression analysis.</p> <p>(2) (5%) Compute the value of R^2 and the standard error of the estimate, and interpret their meaning.</p> <p>(3) (5%) Do the data indicate that the independent variables jointly contribute significant information for the dependent variable? Use the 0.05 significance level.</p> <p>(4) (5%) Test the regression coefficients individually. Would you consider omitting any variables? Use the 0.05 significance level.</p>						Predictor	Coef	StDev	Constant	13.35	4.71	X_2	-0.63	0.23	X_3	1.42	3.34
Predictor	Coef	StDev															
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<tr><td></td><td>.010</td><td>7.82</td><td>5.61</td><td>4.72</td><td>4.22</td><td>3.90</td><td>3.67</td><td>3.50</td><td>3.34</td><td>3.26</td></tr> <tr><td></td><td>.005</td><td>9.55</td><td>6.66</td><td>5.52</td><td>4.89</td><td>4.48</td><td>4.20</td><td>3.99</td><td>3.83</td><td>3.69</td></tr> <tr><td>25</td><td>.100</td><td>2.92</td><td>2.53</td><td>2.32</td><td>2.19</td><td>2.10</td><td>2.03</td><td>1.97</td><td>1.93</td><td>1.89</td></tr> <tr><td></td><td>.050</td><td>4.27</td><td>3.41</td><td>3.02</td><td>2.79</td><td>2.63</td><td>2.52</td><td>2.42</td><td>2.35</td><td>2.30</td></tr> <tr><td></td><td>.025</td><td>5.69</td><td>4.29</td><td>3.69</td><td>3.35</td><td>3.13</td><td>2.96</td><td>2.84</td><td>2.75</td><td>2.68</td></tr> <tr><td></td><td>.010</td><td>7.77</td><td>5.57</td><td>4.68</td><td>4.18</td><td>3.85</td><td>3.63</td><td>3.46</td><td>3.32</td><td>3.22</td></tr> <tr><td></td><td>.005</td><td>9.48</td><td>6.60</td><td>5.46</td><td>4.83</td><td>4.42</td><td>4.14</td><td>3.94</td><td>3.78</td><td>3.64</td></tr> </tbody> </table>						v										v ₁	α	1	2	3	4	5	6	7	8	9	13	.100	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16		.050	4.57	3.81	3.41	3.18	3.03	2.93	2.83	2.77	2.71		.025	6.41	4.97	4.35	4.00	3.77	3.60	3.48	3.39	3.31		.010	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19		.005	11.37	8.19	6.93	6.23	5.79	5.48	5.25	5.08	4.94	14	.100	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12		.050	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65		.025	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21		.010	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.01		.005	11.06	7.92	6.68	6.06	5.56	5.26	5.03	4.86	4.72	15	.100	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09		.050	4.54	3.68	3.28	3.05	2.90	2.79	2.71	2.64	2.59		.025	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12		.010	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89		.005	10.80	7.70	6.48	5.80	5.37	5.07	4.83	4.67	4.54	16	.100	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.05		.050	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54		.025	6.11	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05		.010	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78		.005	10.58	7.51	6.30	5.64	5.21	4.91	4.69	4.52	4.38	17	.100	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03		.050	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.53	2.49		.025	6.06	4.64	4.03	3.68	3.46	3.28	3.16	3.06	2.98		.010	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68		.005	10.38	7.35	6.16	5.50	5.07	4.78	4.56	4.39	4.25	18	.100	3.01	2.63	2.42	2.29	2.20	2.13	2.08	2.04	2.00		.050	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46		.025	5.96	4.56	3.95	3.61	3.38	3.22	3.10	3.01	2.93		.010	8.28	5.99	5.06	4.55	4.22	3.98	3.81	3.67	3.60		.005	10.22	7.21	6.03	5.37	4.94	4.66	4.44	4.28	4.14	19	.100	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98		.050	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42		.025	5.92	4.51	3.90	3.56	3.33	3.17	3.05	2.96	2.88		.010	8.18	5.89	4.96	4.45	4.12	3.88	3.71	3.63	3.55		.005	10.07	7.09	5.92	5.27	4.85	4.56	4.34	4.18	4.04	20	.100	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96		.050	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39		.025	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84		.010	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46		.005	9.94	6.99	5.83	5.17	4.76	4.47	4.26	4.09	3.96	21	.100	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95		.050	4.34	3.48	3.09	2.86	2.70	2.59	2.49	2.42	2.37		.025	5.83	4.42	3.82	3.48	3.25	3.09	2.97	2.87	2.80		.010	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40		.005	9.83	6.89	5.73	5.09	4.68	4.39	4.18	4.01	3.88	22	.100	2.94	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93		.050	4.32	3.46	3.07	2.84	2.68	2.57	2.47	2.40	2.35		.025	5.79	4.38	3.78	3.44	3.22	3.05	2.93	2.84	2.76		.010	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35		.005	9.73	6.81	5.65	5.02	4.61	4.32	4.11	3.94	3.81	23	.100	2.94	2.55	2.34	2.21	2.12	2.05	1.99	1.95	1.92		.050	4.31	3.45	3.06	2.83	2.67	2.56	2.46	2.39	2.34		.025	5.75	4.35	3.75	3.41	3.19	3.02	2.90	2.81	2.73		.010	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30		.005	9.63	6.73	5.58	4.95	4.54	4.26	4.05	3.88	3.75	24	.100	2.93	2.54	2.33	2.20	2.11	2.04	1.98	1.94	1.90		.050	4.29	3.43	3.04	2.81	2.65	2.54	2.44	2.37	2.32		.025	5.72	4.31	3.72	3.38	3.16	2.99	2.87	2.78	2.70		.010	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.34	3.26		.005	9.55	6.66	5.52	4.89	4.48	4.20	3.99	3.83	3.69	25	.100	2.92	2.53	2.32	2.19	2.10	2.03	1.97	1.93	1.89		.050	4.27	3.41	3.02	2.79	2.63	2.52	2.42	2.35	2.30		.025	5.69	4.29	3.69	3.35	3.13	2.96	2.84	2.75	2.68		.010	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22		.005	9.48	6.60	5.46	4.83	4.42	4.14	3.94	3.78	3.64	<p>→ Critical value of F-distrib.</p>
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	.050	4.57	3.81	3.41	3.18	3.03	2.93	2.83	2.77	2.71																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	6.41	4.97	4.35	4.00	3.77	3.60	3.48	3.39	3.31																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	11.37	8.19	6.93	6.23	5.79	5.48	5.25	5.08	4.94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.025	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.01																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	11.06	7.92	6.68	6.06	5.56	5.26	5.03	4.86	4.72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
15	.100	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.050	4.54	3.68	3.28	3.05	2.90	2.79	2.71	2.64	2.59																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	10.80	7.70	6.48	5.80	5.37	5.07	4.83	4.67	4.54																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
16	.100	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.05																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.025	6.11	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.025	6.06	4.64	4.03	3.68	3.46	3.28	3.16	3.06	2.98																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	10.38	7.35	6.16	5.50	5.07	4.78	4.56	4.39	4.25																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
18	.100	3.01	2.63	2.42	2.29	2.20	2.13	2.08	2.04	2.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.050	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.96	4.56	3.95	3.61	3.38	3.22	3.10	3.01	2.93																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	8.28	5.99	5.06	4.55	4.22	3.98	3.81	3.67	3.60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	10.22	7.21	6.03	5.37	4.94	4.66	4.44	4.28	4.14																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
19	.100	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.050	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.92	4.51	3.90	3.56	3.33	3.17	3.05	2.96	2.88																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	8.18	5.89	4.96	4.45	4.12	3.88	3.71	3.63	3.55																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	10.07	7.09	5.92	5.27	4.85	4.56	4.34	4.18	4.04																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
20	.100	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.050	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	9.94	6.99	5.83	5.17	4.76	4.47	4.26	4.09	3.96																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
21	.100	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.050	4.34	3.48	3.09	2.86	2.70	2.59	2.49	2.42	2.37																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.010	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	9.83	6.89	5.73	5.09	4.68	4.39	4.18	4.01	3.88																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.050	4.32	3.46	3.07	2.84	2.68	2.57	2.47	2.40	2.35																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.79	4.38	3.78	3.44	3.22	3.05	2.93	2.84	2.76																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	9.73	6.81	5.65	5.02	4.61	4.32	4.11	3.94	3.81																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
23	.100	2.94	2.55	2.34	2.21	2.12	2.05	1.99	1.95	1.92																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.050	4.31	3.45	3.06	2.83	2.67	2.56	2.46	2.39	2.34																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.75	4.35	3.75	3.41	3.19	3.02	2.90	2.81	2.73																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	9.63	6.73	5.58	4.95	4.54	4.26	4.05	3.88	3.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.050	4.29	3.43	3.04	2.81	2.65	2.54	2.44	2.37	2.32																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.72	4.31	3.72	3.38	3.16	2.99	2.87	2.78	2.70																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.34	3.26																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	9.55	6.66	5.52	4.89	4.48	4.20	3.99	3.83	3.69																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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	.050	4.27	3.41	3.02	2.79	2.63	2.52	2.42	2.35	2.30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.025	5.69	4.29	3.69	3.35	3.13	2.96	2.84	2.75	2.68																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.010	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	.005	9.48	6.60	5.46	4.83	4.42	4.14	3.94	3.78	3.64																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DEGREES OF FREEDOM</th> <th colspan="5">F_{alpha}</th> </tr> <tr> <th>F_{.10}</th> <th>F_{.05}</th> <th>F_{.025}</th> <th>F_{.01}</th> <th>F_{.005}</th> </tr> </thead> <tbody> <tr><td>1</td><td>3.078</td><td>6.314</td><td>12.706</td><td>31.821</td><td>63.657</td></tr> <tr><td>2</td><td>1.886</td><td>2.920</td><td>4.303</td><td>6.965</td><td>9.925</td></tr> <tr><td>3</td><td>1.638</td><td>2.353</td><td>3.182</td><td>4.541</td><td>5.841</td></tr> <tr><td>4</td><td>1.533</td><td>2.132</td><td>2.776</td><td>3.747</td><td>4.604</td></tr> <tr><td>5</td><td>1.476</td><td>2.015</td><td>2.571</td><td>3.365</td><td>4.032</td></tr> <tr><td>6</td><td>1.440</td><td>1.943</td><td>2.447</td><td>3.143</td><td>3.707</td></tr> <tr><td>7</td><td>1.415</td><td>1.895</td><td>2.365</td><td>2.998</td><td>3.499</td></tr> <tr><td>8</td><td>1.397</td><td>1.860</td><td>2.306</td><td>2.896</td><td>3.355</td></tr> <tr><td>9</td><td>1.383</td><td>1.833</td><td>2.262</td><td>2.821</td><td>3.250</td></tr> <tr><td>10</td><td>1.372</td><td>1.812</td><td>2.228</td><td>2.764</td><td>3.169</td></tr> <tr><td>11</td><td>1.363</td><td>1.796</td><td>2.201</td><td>2.718</td><td>3.106</td></tr> <tr><td>12</td><td>1.356</td><td>1.782</td><td>2.179</td><td>2.681</td><td>3.055</td></tr> <tr><td>13</td><td>1.350</td><td>1.771</td><td>2.160</td><td>2.650</td><td>3.012</td></tr> <tr><td>14</td><td>1.345</td><td>1.761</td><td>2.145</td><td>2.624</td><td>2.977</td></tr> <tr><td>15</td><td>1.341</td><td>1.752</td><td>2.131</td><td>2.602</td><td>2.947</td></tr> <tr><td>16</td><td>1.337</td><td>1.746</td><td>2.120</td><td>2.583</td><td>2.921</td></tr> <tr><td>17</td><td>1.333</td><td>1.740</td><td>2.110</td><td>2.567</td><td>2.898</td></tr> <tr><td>18</td><td>1.330</td><td>1.734</td><td>2.101</td><td>2.552</td><td>2.878</td></tr> <tr><td>19</td><td>1.328</td><td>1.729</td><td>2.093</td><td>2.539</td><td>2.861</td></tr> <tr><td>20</td><td>1.325</td><td>1.725</td><td>2.086</td><td>2.528</td><td>2.845</td></tr> <tr><td>21</td><td>1.323</td><td>1.721</td><td>2.080</td><td>2.518</td><td>2.831</td></tr> <tr><td>22</td><td>1.321</td><td>1.717</td><td>2.074</td><td>2.508</td><td>2.819</td></tr> <tr><td>23</td><td>1.319</td><td>1.714</td><td>2.069</td><td>2.500</td><td>2.807</td></tr> </tbody> </table>						DEGREES OF FREEDOM	F_{alpha}					F_{.10}	F_{.05}	F_{.025}	F_{.01}	F_{.005}	1	3.078	6.314	12.706	31.821	63.657	2	1.886	2.920	4.303	6.965	9.925	3	1.638	2.353	3.182	4.541	5.841	4	1.533	2.132	2.776	3.747	4.604	5	1.476	2.015	2.571	3.365	4.032	6	1.440	1.943	2.447	3.143	3.707	7	1.415	1.895	2.365	2.998	3.499	8	1.397	1.860	2.306	2.896	3.355	9	1.383	1.833	2.262	2.821	3.250	10	1.372	1.812	2.228	2.764	3.169	11	1.363	1.796	2.201	2.718	3.106	12	1.356	1.782	2.179	2.681	3.055	13	1.350	1.771	2.160	2.650	3.012	14	1.345	1.761	2.145	2.624	2.977	15	1.341	1.752	2.131	2.602	2.947	16	1.337	1.746	2.120	2.583	2.921	17	1.333	1.740	2.110	2.567	2.898	18	1.330	1.734	2.101	2.552	2.878	19	1.328	1.729	2.093	2.539	2.861	20	1.325	1.725	2.086	2.528	2.845	21	1.323	1.721	2.080	2.518	2.831	22	1.321	1.717	2.074	2.508	2.819	23	1.319	1.714	2.069	2.500	2.807																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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13	1.350	1.771	2.160	2.650	3.012																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
14	1.345	1.761	2.145	2.624	2.977																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
15	1.341	1.752	2.131	2.602	2.947																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
16	1.337	1.746	2.120	2.583	2.921																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
17	1.333	1.740	2.110	2.567	2.898																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
18	1.330	1.734	2.101	2.552	2.878																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
19	1.328	1.729	2.093	2.539	2.861																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
20	1.325	1.725	2.086	2.528	2.845																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
21	1.323	1.721	2.080	2.518	2.831																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
22	1.321	1.717	2.074	2.508	2.819																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
23	1.319	1.714	2.069	2.500	2.807																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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命題紙使用說明：1. 試題將用原件印製，敬請使用黑色墨水正楷書寫或打字（紅色不能製版請勿使用）。
 2. 書寫時請勿超出格外，以免印製不清。
 3. 試題由郵寄遞者請以掛號寄出，以免遺失而示慎重。