

考試科目	統計學	系別	統計系	考試時間	7月3日上午第二節 星期六
注意：附常態分配表,卡方分配表,t分配表,F分配表於最後。 計算四捨五入至小數點後第三位。 (20%) 1. In the following multiple choice questions, please give the correct answer. 1-1. Statistical studies in which researchers do not control variables of interest are (a) experimental studies (b) uncontrolled experimental studies (c) not of any value (d) observational studies 1-2. In a sample of 500 students in a university, 150, or 30%, are Business majors. The 30% is an example of (a) descriptive statistics (b) statistical inference (c) a population (d) a sample 1-3. In deriving a frequency distribution, as the number of classes decreased, the class width (a) decreases (b) remains unchanged (c) increased (d) can increase or decrease depending on the data values 1-4. A continuous probability distribution that is useful in describing the time, or space, between occurrences of an event is a(n) (a) normal probability distribution (b) exponential probability distribution (c) Poisson probability distribution (d) uniform probability distribution 1-5. An experimental design that permits statistical conclusions about two or more factors is a (a) completely randomized design (b) randomized block design (c) factorial design (d) matched-sample design 1-6. A Type II error is committed when (a) a true null hypothesis is mistakenly rejected (b) a true alternative hypothesis is mistakenly rejected (c) the sample size has been too small (d) not enough information has been available 1-7. If a hypothesis is rejected at the 10% level of significance, it (a) will always be rejected at the 5% level (b) will always be accepted at the 5% level (c) will never be tested at the 5% level (d) may be rejected or not rejected at the 5% level 1-8. In a multiple regression analysis, if the model fits poorly, this indicates that a. most of the variation in the dependent variable is explained b. the error terms do not follow normal distribution c. the variances of error terms are not constant d. none of the above answer is correct 1-9. Which of the following is not true? a. Multicollinearity is a condition that exists when the independent variables are highly correlated with the dependent variable. b. Multicollinearity does not affect the F-test of the overall significance. c. Adjusted R-square maybe less than 0. d. R-square must be nonnegative. 1-10. Ten secretaries were sent to take a typing efficiency course. The data set contains the typing speeds of each secretary before and after the course. Which of the following is an adequate nonparametric procedure to test the effectiveness of the course? a. t test for matched samples b. Kruskal-Wallis test c. Sign test d. Wilcoxon signed-rank test					
備考	試題隨卷繳交				
命題委員： -123- (簽章) 93年6月24日					

考試科目	統計學	系別	統計系	考試時間	7月3日 上午第二節 星期二
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2. The monthly salaries of the employees of a corporation are normally distributed with a mean of \$35,000 and a standard deviation of \$5,000.
- What are the minimum and maximum salaries of the middle 95% of the employees? (6%)
 - Suppose 3 employees were randomly selected. What is the probability that salaries of 2 of them exceed \$35,000? (6%)
 - If sixty-eight of the employees have incomes of at least \$45,600, how many individuals are employed in the corporation? (4%)
3. A random sample of 144 accounts of a bank at NCCU branch showed an average daily balance of \$3000. The sample standard deviation is \$600.
- Is it necessary to know anything about the shape of the distribution of the account balances in order to make an interval estimate of the mean of all the account balances? Explain. (3%)
 - A random sample of 100 accounts of this bank at another branch showed an average daily balance of \$3300, and its sample standard deviation is \$800. Test if the mean balances at these branches equal at $\alpha = .05$. (9%)
 - Based on the conclusion in (b), what type of error you might make? (3%)
4. It is crucial that the variance of a production process be less than or equal to 30. A sample of 26 is taken. The sample variance equaled 36. Construct a 90% confidence interval for the population variance. (9%)
5. Ten observations were selected from each of 3 populations, and an analysis of variance was performed on the data. The sum of squares between treatments is 80, i.e. $SS(\text{treatment})=80$, and the sum of squares due to error is 108, i.e. $SS(\text{Error})=108$.
- Write out assumptions for analysis of variance. (4%)
 - The three sample means are $\bar{y}_1 = 25$, $\bar{y}_2 = 23$, and $\bar{y}_3 = 27$. At $\alpha = .05$, use Fisher's LSD (least significance difference) procedure to test all possible pairwise comparisons. What conclusion can you draw? (9%)
6. A real estate company collects data at 10 different places showing the office building vacancy rates (x , unit: %) and rental rates (y , unit: \$100 per square foot). Part of the results are:
- $$\sum X = 160, \quad \sum X^2 = 2846, \quad \sum Y = 98, \quad \sum Y^2 = 1023.20, \quad \sum XY = 1463.2$$
- Also, $\sum (x - \bar{x})(y - \bar{y}) = \sum xy - \frac{\sum x \sum y}{n}$
- Using the above information, develop the least squares estimated regression line. (5%)
 - Develop a 95% interval estimate for the expected rental rate for places with a 20% vacant rate. (9%)
7. A sample of 150 individuals (males and females) was surveyed, and the individuals were asked to indicate their yearly incomes. The results of the survey are shown below.
- | Income Category | Male | Female |
|-------------------------|------|--------|
| \$20,000 up to \$40,000 | 15 | 45 |
| \$40,000 up to \$60,000 | 35 | 35 |
| \$60,000 up to \$80,000 | 10 | 10 |
- Test at $\alpha = 0.05$ to determine if the yearly income is independent of the gender. (9%)
 - If a significant difference is found, state out where the differences occur. (4%)

備 考 試 題 隨 卷 繳 交

考試科目	統計學	系別	統計系	考試時間	7月3日上午第二節 星期六
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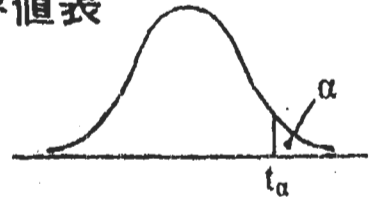
標準常態分配表



Example:
If $Z = 1.00$, then the area between the mean and this value of Z is .3413.

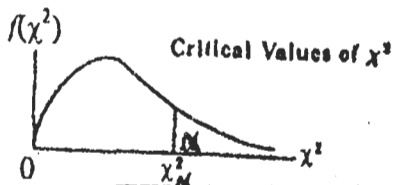
Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4986	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
4.0	.4999									

t分配臨界值表



Degrees of Freedom	t.100	t.050	t.025	t.010	t.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	1.753	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
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
∞	1.282	1.645	1.960	2.326	2.576

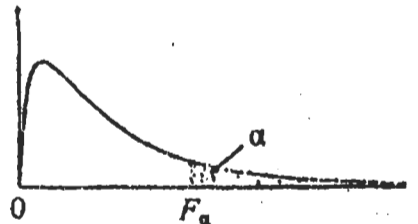
卡方分配臨界值表



DEGREES OF FREEDOM	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.800}$	$\chi^2_{.700}$	$\chi^2_{.600}$	$\chi^2_{.500}$
1	0.0000393	0.0001571	0.0009821	0.0039321	0.0157908	2.70554	3.84146	5.02389	6.63490
2	0.0100251	0.0201007	0.0506356	0.102587	0.210720	4.60517	5.99147	7.37776	9.21034
3	0.0717212	0.114832	0.215795	0.351846	0.584375	6.25139	7.81473	9.34840	11.3449
4	0.206990	0.297110	0.484419	0.710721	1.063623	7.77944	9.48773	11.1433	13.2767
5	0.411740	0.554300	0.831211	1.145476	1.61031	9.23635	11.0705	12.8325	15.0863
6	0.675272	0.872085	1.237347	1.63539	2.20413	10.6446	12.5916	14.4494	16.8119
7	0.989265	1.239043	1.68987	2.16735	2.83311	12.0170	14.0671	16.0128	18.4753
8	1.344419	1.646482	2.17973	2.73264	3.48954	13.3616	15.5073	17.5346	20.0902
9	1.734926	2.087912	2.70039	3.32511	4.16816	14.6837	16.9190	19.0228	21.6660
10	2.15585	2.55821	3.24697	3.94030	4.86518	15.9871	18.3070	20.4831	23.2093
11	2.60321	3.05347	3.81575	4.57481	5.57779	17.2750	19.6751	21.9200	24.7250
12	3.07382	3.57056	4.40379	5.22603	6.30380	18.5494	21.0261	23.3367	26.2170
13	3.56503	4.10691	5.00874	5.89186	7.04150	19.8119	22.3621	24.7356	27.6883
14	4.07468	4.66043	5.62872	6.57063	7.78953	21.0642	23.6848	26.1190	29.1413
15	4.60094	5.22935	6.26214	7.26094	8.54675	22.3072	24.9958	27.4884	30.5779
16	5.14224	5.81221	6.90766	7.96164	9.31223	23.5418	26.2962	28.8454	31.9999
17	5.69724	6.40776	7.56418	8.67176	10.0852	24.7690	27.5871	30.1910	33.4087
18	6.26481	7.01491	8.23075	9.39046	10.8649	25.9894	28.8693	31.5264	34.8053
19	6.84398	7.63273	8.90655	10.1170	11.6509	27.2036	30.1435	32.8523	36.1908
20	7.43386	8.26040	9.59083	10.8508	12.4426	28.4120	31.4104	34.1696	37.5662
21	8.03366	8.89720	10.28293	11.5913	13.2396	29.6151	32.6705	35.4789	38.9321
22	8.64272	9.54249	10.9823	12.3380	14.0415	30.8133	33.9244	36.7807	40.2894
23	9.26042	10.19567	11.6885	13.0905	14.8479	32.0069	35.1725	38.0757	41.6384
24	9.88623	10.8564	12.4011	13.8484	15.6587	33.1963	36.4151	39.3641	42.9798
25	10.5197	11.5240	13.1197	14.6114	16.4734	34.3816	37.6525	40.6465	44.3141
26	11.1603	12.1981	13.8439	15.3791	17.2919	35.5631	38.8852	41.9232	45.6417
27	11.8076	12.8786	14.5733	16.1513	18.1138	36.7412	40.1133	43.1944	46.9630
28	12.4613	13.5648	15.3079	16.9279	18.9392	37.9159	41.3372	44.4607	48.2782
29	13.1211	14.2565	16.0471	17.7083	19.7677	39.0875	42.5569	45.7222	49.5879
30	13.7867	14.9535	16.7908	18.4926	20.5992	40.2560	43.7729	46.9792	50.8922
40	20.7065	22.1643	24.4331	26.5093	29.0505	51.8050	55.7585	59.3417	63.6907
50	27.9907	29.7067	32.3574	34.7642	37.6886	63.1671	67.5048	71.4202	76.1539
60	35.5346	37.4848	40.4817	43.1879	46.4589	74.3970	79.0819	83.2976	88.3794
70	43.2752	45.4418	48.7576	51.7393	55.3290	85.5271	90.5312	95.0231	100.425
80	51.1720	53.5400	57.1532	60.3915	64.2778	96.5782	101.879	106.629	112.329
90	59.1963	61.7541	65.6466	69.1260	73.2912	107.565	113.145	118.136	124.116
100	67.3276	70.0648	74.2219	77.9295	82.3581	118.498	124.342	129.561	135.807

F分配臨界值表

$P(F > F_\alpha) = \alpha$



$\nu_1(d.f.)$	$\nu_2(d.f.)$	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	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	

考試科目	微積分	系別	統計學系	考試時間	7月3日 上午 第二節 星期六 (下)
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(1) Find the inflection points, local (relative) maxima and minima of $f(x) = x(x^2 - 1)^2$.

(10%)

(2) Find the area A lying between the curves $y = \sin x$ and $y = \cos x$ from $x = 0$ to $x = \frac{\pi}{2}$.

(10%)

(3) $x^{\frac{2}{3}} + y^{\frac{2}{3}} = 1$, find $\int_0^1 \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx = ?$

(10%)

(4) ① Find $\lim_{x \rightarrow 0} \frac{\int_0^{x^2} (e^{t^2} + 4) dt}{(\sin x)^2} = ?$

(30%)

② $[\sin(yz)]^2 = \cos(xz)$, Find $\frac{\partial^2 z}{\partial x^2} = ?$

③ $\begin{cases} f(x, y) = \frac{5x^4 - y^3}{x^2 + 3y^2}, & (x, y) \neq (0, 0) \\ f(0, 0) = 0 \end{cases}$. Find $f_x(0, 0) = ?$, $f_y(0, 0) = ?$

(5) ① Find $\int_0^{\pi/2} e^{\sin x} \cdot (\sin 2x) dx = ?$

(40%)

② Find $\int_0^1 dx \int_x^1 \frac{y^{10}}{x^2 + y^2} dy = \int_?^? dy \int_?^? \frac{y^{10}}{x^2 + y^2} dx = ?$

③ Find Maclaurin series for $\int_0^x \frac{e^{t^2} - 1}{t} dt$.

④ Solve the differential equation $\frac{dy}{dx} = xy(y+1)e^{x^2}$.

備 考 試 題 隨 卷 繳 交