

系所組別：資源工程學系丙組

考試科目：統計學

考試日期：0307，節次：3

※ 考生請注意：本試題 可 不可 使用計算機**MULTIPLE CHOICE QUESTIONS (4% for each question)**

In the following multiple choice questions, choose the correct answer.

1. If A and B are independent events with $P(A) = 0.65$ and $P(A \cap B) = 0.26$, then, $P(B) =$
 - a. 0.400
 - b. 0.169
 - c. 0.390
 - d. 0.650
2. A six-sided die is tossed 3 times. The probability of observing three ones in a row is
 - a. $1/3$
 - b. $1/6$
 - c. $1/27$
 - d. $1/216$
3. A simple random sample of 100 observations was taken from a large population. The sample mean and the standard deviation were determined to be 80 and 12 respectively. The standard error of the mean is
 - a. 1.20
 - b. 0.12
 - c. 8.00
 - d. 0.80
4. Which of the following is an example of nonprobabilistic sampling?
 - a. simple random sampling
 - b. stratified simple random sampling
 - c. cluster sampling
 - d. judgment sampling
5. Which of the following is(are) point estimator(s)?
 - a. σ
 - b. μ
 - c. s
 - d. α
6. A random sample of 16 statistics examinations was taken. The average score, in the sample, was 76.2 with a variance of 144. The 99% confidence interval for the true average examination score is
 - a. 49.677 to 102.723
 - b. 73.99 to 78.41
 - c. 67.359 to 85.041
 - d. 67.437 to 84.963

(背面仍有題目,請繼續作答)

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7. An interval estimate is a range of values used to estimate
- the shape of the population's distribution
 - the sampling distribution
 - a sample statistic
 - a population parameter

Exhibit AA

$n = 16$ $\bar{x} = 75.76$ $s = 8.246$ $H_0: \mu \geq 80$
 $H_a: \mu < 80$

8. Refer to Exhibit AA. The standardized test statistic equals
- 2.12
 - 0.53
 - 0.53
 - 0.483
9. Refer to Exhibit AA. The p-value is equal to
- 0.025
 - 0.05
 - 0.525
 - 0.025
10. If a hypothesis is rejected at 95% confidence, it
- will always be accepted at 90% confidence
 - will always be rejected at 90% confidence
 - will sometimes be rejected at 90% confidence
 - None of these alternatives is correct.

Exhibit BB

A statistics teacher wants to see if there is any difference in the abilities of students enrolled in statistics today and those enrolled five years ago. A sample of final examination scores from students enrolled today and from students enrolled five years ago was taken. You are given the following results.

	Today	Five Years Ago
Mean	82	88
Variance	112.5	54
Sample Size	45	36

11. Refer to Exhibit BB. The point estimate for the difference between the means of the two populations is
- 58.5
 - 9
 - 9
 - 6

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12. Refer to Exhibit BB. The point estimate for the standard deviation of the difference between the means of the two populations is
- 12.9
 - 9.3
 - 4
 - 2
13. A sample of 41 observations yielded a sample standard deviation of 5. If we want to test $H_0: \sigma^2 = 20$, the test statistic is
- 100
 - 10
 - 51.25
 - 50

Exhibit CC

The table below gives beverage preferences for random samples of teens and adults.

	Teens	Adults	Total
Coffee	50	200	250
Tea	100	150	250
Soft Drink	200	200	400
Other	<u>50</u>	<u>50</u>	<u>100</u>
	400	600	1,000

We are asked to test for independence between age (i.e., adult and teen) and drink preferences.

14. Refer to Exhibit CC. The calculated value for this test for independence is
- 0
 - 8.4
 - 62.5
 - 82.5
15. Refer to Exhibit CC. The result of the test is that the
- hypothesis of independence can be rejected
 - hypothesis of independence cannot be rejected
 - test is inconclusive
 - None of these alternatives is correct.

Exhibit DD

You want to test whether or not the following sample of 30 observations follows a normal distribution.

The mean of the sample equals 11.83, and the standard deviation equals 4.53.

2	3	5	5	7	8	8	9	9	10
11	11	12	12	12	12	13	13	13	14
15	15	15	16	16	17	17	18	18	19

(背面仍有題目,請繼續作答)

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16. Refer to Exhibit DD. The calculated value for the test statistic equals
- 0
 - 1.67
 - 2
 - 6
17. Refer to Exhibit DD. The hypothesis is to be tested at the 5% level of significance. The critical value from the table equals
- 1.645
 - 1.96
 - 7.815
 - 12.592
18. Refer to Exhibit DD. The conclusion of the test is that the
- data follows a normal distribution
 - data does not follow a normal distribution
 - test is inconclusive
 - None of these alternatives is correct.

Exhibit EE

Part of an ANOVA table is shown below. (hint: you need to fill the table first)

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Treatments	64			8
Within Treatments			2	
Error				
Total	100			

19. Refer to Exhibit EE. If at 95% confidence we want to determine whether or not the means of the populations are equal, the critical value of F is
- 5.80
 - 2.93
 - 3.16
 - 2.90
20. Refer to Exhibit EE. The conclusion of the test is that the means
- are equal
 - may be equal
 - are not equal
 - None of these alternatives is correct.

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21. In a regression model involving more than one independent variable, which of the following tests must be used in order to determine if the relationship between the dependent variable and the set of independent variables is significant?
- t test
 - F test
 - Either a t test or a chi-square test can be used.
 - chi-square test

Exhibit FF

The following information regarding a dependent variable (Y) and an independent variable (X) is provided.

Y	X
4	2
3	1
4	4
6	3
8	5

$$SSE = 6$$

$$SST = 16$$

22. Refer to Exhibit FF. The coefficient of determination is
- 0.7096
 - 0.7906
 - 0.625
 - 0.375
23. Refer to Exhibit FF. The MSE is
- 1
 - 2
 - 3
 - 4
24. In multiple regression analysis, the correlation among the independent variables is termed
- homoscedasticity
 - linearity
 - multicollinearity
 - adjusted coefficient of determination

(背面仍有題目,請繼續作答)

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25. A regression analysis involved 17 independent variables and 697 observations. The critical value of t for testing the significance of each of the independent variable's coefficients will have
- 696 degrees of freedom
 - 16 degrees of freedom
 - 713 degrees of freedom
 - 714 degrees of freedom

表 6.1 標準常態機率分配之面積或機率

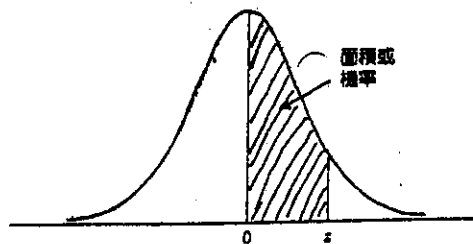
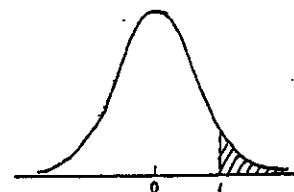


表 8.3 右尾面積的 t 分配表。例如，若自由度為 10，則 $t_{0.025}$ = 2.228



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4986	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

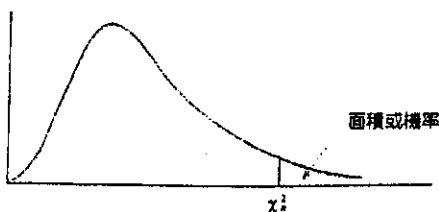
自由度	0.10	0.05	0.025	0.01	0.005
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	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
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576

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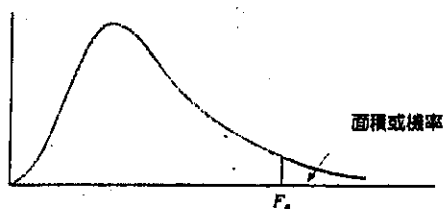
表 3 卡方分配



表中的數值是 χ^2_{α} ，其中 α 代表卡方分配右尾的面積或機率。例如，若自由度為 10 且右尾面積為 0.01，則 $\chi^2_{0.01} = 23.2093$ 。

自由度	右尾面積									
	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
1	392.704×10^{-10}	157.088×10^{-9}	982.069×10^{-9}	393.214×10^{-8}	0.0157908	2.70554	3.84146	5.02389	6.63490	7.87944
2	0.0100251	0.0201007	0.0506356	0.102587	0.210720	4.60517	5.99147	7.37776	9.21034	10.5966
3	0.0717212	0.114832	0.215795	0.351746	0.584375	6.25139	7.81473	9.34840	11.3449	12.8381
4	0.206990	0.297110	0.484419	0.710721	1.063623	7.77944	9.48773	11.1433	13.2767	14.8602
5	0.411740	0.554300	0.831211	1.145476	1.61031	9.23635	11.0705	12.8325	15.0863	16.7496
6	0.675727	0.872085	1.237347	1.63539	2.20413	10.6446	12.5916	14.4494	16.8119	18.5476
7	0.989265	1.239043	1.68987	2.16735	2.83311	12.0170	14.0671	16.0128	18.4753	20.2777
8	1.344419	1.646482	2.17973	2.73264	3.48954	13.3616	15.5073	17.5346	20.0902	21.9550
9	1.734926	2.087912	2.70039	3.32511	4.16816	14.6837	16.9190	19.0228	21.6660	23.5893
10	2.15585	2.55821	3.24697	3.94030	4.86518	15.9871	18.3070	20.4831	23.2093	25.1882
11	2.60321	3.05347	3.81575	4.57481	5.57779	17.2750	19.6751	21.9200	24.7250	26.7569
12	3.07382	3.57056	4.40379	5.22603	6.30380	18.5494	21.0261	23.3367	26.2170	28.2995
13	3.56503	4.10691	5.00874	5.89186	7.04150	19.8119	22.3621	24.7356	27.6883	29.8194
14	4.07468	4.66043	5.62872	6.57063	7.78953	21.0642	23.6848	26.1190	29.1413	31.3193
15	4.60094	5.22935	6.26214	7.26094	8.54675	22.3072	24.9958	27.4884	30.5779	32.8013
16	5.14224	5.81221	6.90766	7.96164	9.31223	23.5418	26.2962	28.8454	31.9999	34.2672
17	5.69724	6.40776	7.56418	8.67176	10.0852	24.7690	27.5871	30.1910	33.4087	35.7185
18	6.26481	7.01491	8.23075	9.39046	10.8649	25.9894	28.8693	31.5264	34.8053	37.1564
19	6.84398	7.63273	8.90655	10.1170	11.6509	27.2036	30.1435	32.8523	36.1908	38.5822

表 4 F 分配



表中的數值是 F_{α} 值，其中 α 代表 F 分配右尾之面積或機率。例如，若分子自由度為 12，分母自由度為 15 且右尾面積為 0.05，則 $F_{0.05} = 2.48$ 。

$F_{0.05}$ 值之表

分母自由度	分子自由度																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13