編號：　118　系所：資源工程學系丙組　　科目：統計學

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選擇題（選出正確答案，每題四分）

1. Stratified random sampling is a method of selecting a sample in which
   a. the sample is first divided into strata, and then random samples are taken from each stratum
   b. various strata are selected from the sample
   c. the population is first divided into strata, and then random samples are drawn from each stratum
   d. None of these alternatives is correct.
2. A population consists of 8 items. The number of different simple random samples of size 3 that can be selected from this population is
   a. 24
   b. 56
   c. 512
   d. 128
3. A random sample of 121 bottles of cologne showed an average content of 4 ounces. It is known that the standard deviation of the contents (i.e., of the population) is 0.22 ounces. In this problem the 0.22 is
   a. a parameter
   b. a statistic
   c. the standard error of the mean
   d. the average content of colognes in the long run
4. The level of significance is the
   a. maximum allowable probability of Type II error
   b. maximum allowable probability of Type I error
   c. same as the confidence coefficient
   d. same as the p-value
5. For a one-tailed test (upper tail), a sample size of 18 at 95% confidence, t =
   a. 2.12
   b. -2.12
   c. -1.740
   d. 1.740

Exhibit AA

The following information was obtained from independent random samples.
Assume normally distributed populations with equal variances.

	Sample 1	**Sample 2**
Sample Mean	45	42
Sample Variance	85	90
Sample Size	10	12

6. Refer to Exhibit AA. The 95% confidence interval for the difference between the two population means is
   a. -5.36 to 11.36
   b. -5 to 3
   c. -4.86 to 10.86
   d. -2.65 to 8.65
7. Refer to Exhibit AA. The null hypothesis to be tested is H_0: $\mu_1 - \mu_2 \geq 0$. The test statistic for the difference between the two population means is
   a. .186
   b. .32
   c. .748
   d. 1
8. The producer of a certain medicine claims that their bottling equipment is very accurate and that the standard deviation of all their filled bottles is 0.1 ounce or less. A sample of 20 bottles showed a standard deviation of 0.11. The test statistic to test the claim is
   a. 400
   b. 22.99
   c. 4.85
   d. 20

（背面仍有題目，請繼續作答）

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Exhibit BB
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	50	50	100
	400	600	1,000

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

9. Refer to Exhibit BB. With a .05 level of significance, the critical value for the test is
   a. 1.645
   b. 7.815
   c. 14.067
   d. 15.507
10. Refer to Exhibit BB. The expected number of adults who prefer coffee is
   a. 0.25
   b. 0.33
   c. 150
   d. 200

Exhibit CC
SSTR = 6,750　　H_0: $\mu_1=\mu_2=\mu_3=\mu_4$
SSE = 8,000　　H_a: at least one mean is different
$n_T = 20$

11. Refer to Exhibit CC. The test statistic to test the null hypothesis equals
   a. 0.22
   b. 0.84
   c. 4.22
   d. 4.5
12. Refer to Exhibit CC. The null hypothesis is to be tested at the 5% level of significance. The critical value from the table is
   a. 2.87
   b. 3.24
   c. 4.08
   d. 8.7
13. In regression analysis, if the dependent variable is measured in dollars, the independent variable
   a. must also be in dollars
   b. must be in some unit of currency
   c. can be any units
   d. can not be in dollars

Exhibit DD
You are given the following information about y and x.

y Dependent Variable	x Independent Variable
5	15
7	12
9	10
11	7

14. Refer to Exhibit DD. The least squares estimate of b_0 equals
   a. -0.7647
   b. -1.3
   c. 164.1176

d. 16.41176

15. Refer to Exhibit DD. The coefficient of determination equals
    a. -0.99705
    b. -0.9941
    c. 0.9941
    d. 0.99705
16. If the coefficient of correlation is a positive value, then
    a. the intercept must also be positive
    b. the coefficient of determination can be either negative or positive, depending on the value of the slope
    c. the regression equation could have either a positive or a negative slope
    d. the slope of the line must be positive
17. In multiple regression analysis, the general linear model
    a. can not be used to accommodate curvilinear relationships between dependent variables and independent variables
    b. can be used to accommodate curvilinear relationships between the independent variables and dependent variable
    c. must contain more than 2 independent variables
    d. None of these alternatives is correct.
18. A graph showing the probability of accepting the lot as a function of the percent defective in the lot is
    a. a power curve
    b. a control chart
    c. an operating characteristic curve
    d. None of these alternatives is correct.
19. A control chart that is used when the output of a production process is measured in terms of the percent defective is
    a. a P chart
    b. an X bar chart
    c. a process chart
    d. None of these alternatives is correct.

Exhibit EE

$f(x) = (1/10)\ e^{-x/10}\ \ x \geq 0$

20. Refer to Exhibit EE. The mean of x is
    a. 0.10
    b. 10
    c. 100
    d. 1,000
21. Refer to Exhibit EE. The probability that x is between 3 and 6 is
    a. 0.4512
    b. 0.1920
    c. 0.2592
    d. 0.6065
22. A population has a mean of 300 and a standard deviation of 18. A sample of 144 observations will be taken. The probability that the sample mean will be between 297 to 303 is
    a. 0.4332
    b. 0.8664
    c. 0.9332
    d. 0.0668
23. For a one-tailed test (lower tail) at 89.8% confidence, Z =
    a. -1.27
    b. -1.53
    c. -1.96
    d. -1.64

（背面仍有題目，請繼續作答）

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Exhibit FF

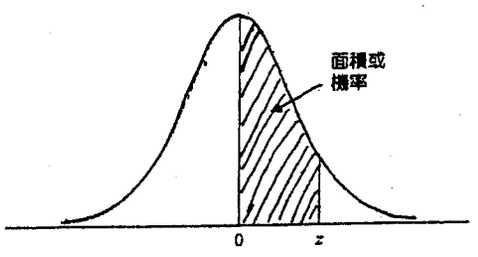
You want to test whether or not the following sample of 30 observations follows a normal distribution. The mean of the sample equals 11.83, and the standard deviation equals 4.53. The number of intervals or categories used to test the hypothesis for this problem is 6.

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

24. Refer to Exhibit FF. The calculated value for the test statistic equals
    a. 0
    b. 1.67
    c. 2
    d. 6

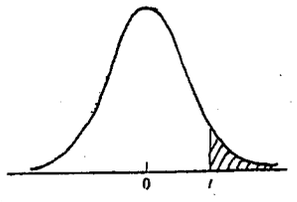
25. Refer to Exhibit FF. The hypothesis is to be tested at the 5% level of significance. The critical value from the table equals
    a. 1.645
    b. 1.96
    c. 7.815
    d. 12.592

表 6.1 標準常態機率分配之面積或機率



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	02454	0.2486	0.2518	0.2549
0.7	0.2580	.02612	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

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



自由度	右尾面積（陰影部分） 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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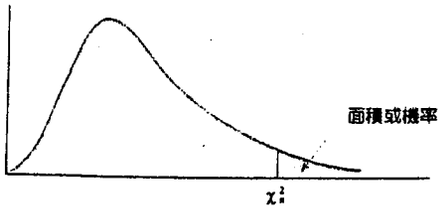
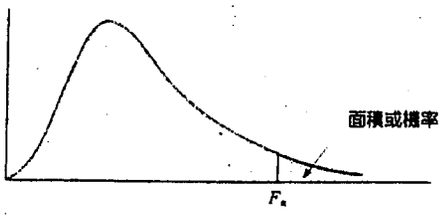
表 3　卡方分配



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	$392{,}704\times10^{-10}$	$157{,}088\times10^{-9}$	$982{,}069\times10^{-9}$	$393{,}214\times10^{-8}$	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