

國立成功大學

114學年度碩士班招生考試試題

編 號：72

系 所：資源工程學系

科 目：統計學

日 期：0211

節 次：第 3 節

注 意：1.不可使用計算機
2.請於答案卷(卡)作答，於
試題上作答，不予計分。

單選題 (每題 4 分，共 25 題)

1. The intersection of two mutually exclusive events
 - a. can be any value between 0 to 1
 - b. must always be equal to 1
 - c. must always be equal to 0
 - d. can be any positive value
2. If a penny is tossed three times and comes up heads all three times, the probability of heads on the fourth trial is
 - a. zero
 - b. $1/16$
 - c. $1/2$
 - d. larger than the probability of tails
3. The Poisson probability distribution is a
 - a. continuous probability distribution
 - b. discrete probability distribution
 - c. uniform probability distribution
 - d. normal probability distribution
4. Assume that you have a binomial experiment with $p = 0.5$ and a sample size of 100. The expected value of this distribution is
 - a. 0.50
 - b. 0.30
 - c. 100
 - d. 50
5. The point estimator with the smaller variance is said to have
 - a. smaller relative efficiency
 - b. greater relative efficiency
 - c. smaller relative consistency
 - d. greater relative consistency
6. 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

7. For a one-tailed test (upper tail), a sample size of 18 at 95% confidence, $t =$
- 2.12
 - 2.12
 - 1.740
 - 1.740

Exhibit AA

Salary information for a random sample of male and female employees of a large company is shown below.

	Male	Female
Sample Size	64	36
Sample Mean Salary (in \$1,000)	44	41
Sample Variance	128	72

8. Refer to Exhibit AA. The standard error for the difference between the two means is
- 4
 - 7.46
 - 4.24
 - 2.0
9. Refer to Exhibit AA. The 95% confidence interval for the difference between the means of the two populations is
- 0 to 6.92
 - 2 to 2
 - 1.96 to 1.96
 - 0.92 to 6.92
10. 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
- 400
 - 22.99
 - 4.85
 - 20

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	<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.

11. Refer to Exhibit BB. With a .05 level of significance, the critical value for the test is
- 1.645
 - 7.815
 - 14.067
 - 15.507
12. Refer to Exhibit BB. The expected number of adults who prefer coffee is
- 0.25
 - 0.33
 - 150
 - 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 $n_T = 20$

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

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

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.
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

A regression and correlation analysis resulted in the following information regarding a dependent variable (y) and an independent variable (x).

$$n = 10$$

$$\Sigma x = 55$$

$$\Sigma y = 55$$

$$\Sigma x^2 = 385$$

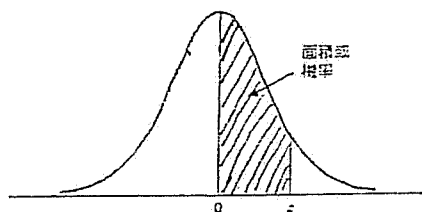
$$\Sigma y^2 = 385$$

$$\Sigma xy = 220$$

22. Refer to Exhibit FF. The least squares estimate of b_1 equals
- 1
 - 1
 - 5.5
 - 11
23. Refer to Exhibit FF. The least squares estimate of b_0 equals
- 1
 - 1
 - 5.5
 - 11

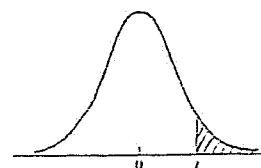
24. Refer to Exhibit FF. The point estimate of y when $x = 20$ is
- a. 0
 - b. 31
 - c. 9
 - d. -9
25. Refer to Exhibit FF. The sample correlation coefficient equals
- a. 0
 - b. -1
 - c. +1
 - d. -0.5

表 標準常態機率分配之面積或機率



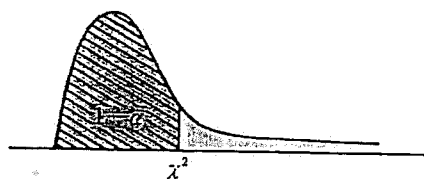
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	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	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

表 右尾面積分配表 (例如：當自由度為 10，則 $t_{0.05} = 1.812$)

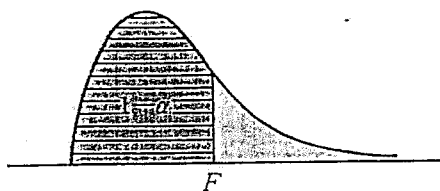


右尾面積 (標準部分)

自由度	0.10	0.05	0.025	0.01	0.005
1	1.878	1.634	1.270	0.816	0.638
2	1.886	1.634	1.270	0.816	0.638
3	1.638	1.274	1.055	0.641	0.500
4	1.533	1.192	0.941	0.549	0.429
5	1.476	1.156	0.879	0.505	0.398
6	1.440	1.133	0.833	0.470	0.375
7	1.415	1.115	0.805	0.441	0.354
8	1.397	1.099	0.785	0.418	0.339
9	1.383	1.085	0.769	0.398	0.329
10	1.372	1.072	0.755	0.381	0.321
11	1.363	1.061	0.743	0.366	0.314
12	1.356	1.051	0.733	0.352	0.308
13	1.350	1.042	0.724	0.340	0.303
14	1.345	1.034	0.716	0.329	0.298
15	1.341	1.027	0.709	0.319	0.294
16	1.337	1.021	0.703	0.310	0.290
17	1.333	1.015	0.697	0.302	0.286
18	1.330	1.010	0.692	0.295	0.283
19	1.328	1.006	0.688	0.289	0.280
20	1.325	1.002	0.684	0.284	0.277
21	1.323	1.000	0.681	0.280	0.275
22	1.321	0.997	0.678	0.276	0.272
23	1.319	0.995	0.676	0.273	0.270
24	1.318	0.993	0.674	0.271	0.268
25	1.316	0.991	0.672	0.269	0.266
26	1.315	0.990	0.670	0.267	0.265
27	1.314	0.989	0.669	0.266	0.264
28	1.313	0.988	0.668	0.265	0.263
29	1.311	0.987	0.667	0.264	0.262
30	1.310	0.986	0.666	0.263	0.261
40	1.303	0.980	0.660	0.258	0.256
60	1.296	0.971	0.650	0.250	0.247
120	1.289	0.963	0.643	0.243	0.241
∞	1.282	0.954	0.636	0.236	0.234

附表 ● χ^2 分配

自由度	機 率 $1 - \alpha$							
	.005	.010	.025	.050	.950	.975	.990	.995
1	---	---	---	.004	3.84	5.02	6.63	7.88
2	.01	.02	.05	.10	5.99	7.38	9.21	10.60
3	.07	.11	.22	.35	7.81	9.35	11.34	12.84
4	.21	.30	.48	.71	9.49	11.14	13.28	14.86
5	.41	.55	.83	1.15	11.07	12.83	15.09	16.75
6	.68	.87	1.24	1.64	12.59	14.45	16.81	18.55
7	.99	1.24	1.69	2.17	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	15.51	17.53	20.09	21.96
9	1.73	2.09	2.70	3.33	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	18.31	20.48	23.21	25.19
11	2.60	3.05	3.82	4.57	19.68	21.92	24.72	26.76
12	3.07	3.57	4.40	5.23	21.03	23.34	26.22	28.30
13	3.57	4.11	5.01	5.89	22.36	24.74	27.69	29.82
14	4.07	4.66	5.63	6.57	23.68	26.12	29.14	31.32
15	4.60	5.23	6.26	7.26	25.00	27.49	30.58	32.80
16	5.14	5.81	6.91	7.96	26.30	28.85	32.00	34.27
17	5.70	6.41	7.56	8.67	27.59	30.19	33.41	35.72
18	6.26	7.01	8.23	9.39	28.87	31.53	34.81	37.16
19	6.84	7.63	8.91	10.12	30.14	32.85	36.19	38.58
20	7.43	8.26	9.59	10.85	31.41	34.17	37.57	40.00
21	8.03	8.90	10.28	11.59	32.67	35.48	38.93	41.40
22	8.64	9.54	10.98	12.34	33.92	36.78	40.29	42.80
23	9.26	10.20	11.69	13.09	35.17	38.08	41.64	44.18
24	9.89	10.86	12.40	13.85	36.42	39.36	42.98	45.56
25	10.52	11.52	13.12	14.61	37.65	40.65	44.31	46.93
26	11.16	12.20	13.84	15.38	38.89	41.92	45.64	48.29
27	11.81	12.88	14.57	16.15	40.11	43.19	46.96	49.64
28	12.46	13.56	15.31	16.93	41.34	44.46	48.28	50.99
29	13.12	14.26	16.05	17.71	42.56	45.72	49.59	52.34
30	13.79	14.95	16.79	18.49	43.77	46.98	50.89	53.67
40	20.71	22.16	24.43	26.51	55.76	59.34	63.69	66.77
50	27.99	29.71	32.36	34.76	67.50	71.42	76.15	79.49
60	35.53	37.48	40.48	43.19	79.08	83.30	88.38	91.95
70	43.28	45.44	48.76	51.74	90.53	95.02	100.43	104.22
80	51.17	53.54	57.15	60.39	101.88	106.63	112.33	116.32
90	59.20	61.75	65.65	69.13	113.14	118.14	124.12	128.30
100	67.33	70.06	74.22	77.93	124.34	129.56	135.81	140.17

附表 1 F 分配

$$1 - \alpha = 0.95$$

$\nu_1 \backslash \nu_2$	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	19.164	19.247	19.296	19.330	19.353	19.371	19.385
3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8868	8.8452	8.8123
4	7.7086	6.9443	6.5914	6.3883	6.2560	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	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2066	4.1468	4.0990
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767
8	5.3177	4.4590	4.0662	3.8378	3.6875	3.5806	3.5005	3.4381	3.3881
9	5.1174	4.2565	3.8626	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789
10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876
16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377
17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563
19	4.3808	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227
20	4.3513	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5757	2.4876	2.4205	2.3661
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419
23	4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002
25	4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821
26	4.2252	3.3690	2.9751	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655
27	4.2100	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501
28	4.1960	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.2360
29	4.1830	3.3277	2.9340	2.7014	2.5454	2.4324	2.3463	2.2782	2.2229
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107
40	4.0848	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2540	2.1665	2.0970	2.0401
120	3.9201	3.0718	2.6802	2.4472	2.2900	2.1750	2.0867	2.0164	1.9588
∞	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8799