國立成功大學
110學年度碩士班招生考試試題

編　號：89

系　所：資源工程學系

科　目：統計學

日　期：0202

節　次：第 3 節

備　註：不可使用計算機

編號： 89

國立成功大學 110 學年度碩士班招生考試試題

系　　所：資源工程學系

考試科目：統計學

考試日期：0202，節次：3

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

共 25 題，單選題，每題 4 分

1. If you are conducting an experiment where the probability of a success is .02 and you are interested in the probability of 4 successes in 15 trials, the correct probability function to use is the
   a. standard normal probability density function
   b. normal probability density function
   c. Poisson probability function
   d. binomial probability function

2. In the textile industry, a manufacturer is interested in the number of blemishes or flaws occurring in each 100 feet of material. The probability distribution that has the greatest chance of applying to this situation is the
   a. normal distribution
   b. binomial distribution
   c. Poisson distribution
   d. uniform distribution

3. Z is a standard normal random variable. The $P(-1.5 \leq Z \leq 1.09)$ equals
   a. 0.4322
   b. 0.3621
   c. 0.7953
   d. 0.0711

4. There are 6 children in a family. The number of children defines a population. The number of simple random samples of size 2 (without replacement) which are possible equals
   a. 12
   b. 15
   c. 3
   d. 16

5. Whenever the population standard deviation is **unknown** and the population has a normal or near-normal distribution, which distribution is used in developing an interval estimation?
   a. standard distribution
   b. z distribution
   c. alpha distribution
   d. t distribution

Exhibit AA

The manager of a grocery store has taken a random sample of 100 customers. The average length of time it took these 100 customers to check out was 3.0 minutes. It is known that the standard deviation of the population of checkout times is one minute.

6. Refer to Exhibit AA. The standard error of the mean equals
   a. 0.001
   b. 0.010
   c. 0.100
   d. 1.000

7. Refer to Exhibit AA. With a .95 probability, the sample mean will provide a margin of error of
   a. 1.96
   b. 0.10
   c. 0.196
   d. 1.64

8. The following random sample from a population whose values were normally distributed was collected.

   10　　12　　18　　16

   The 80% confidence interval for μ is
   a. 12.054 to 15.946
   b. 10.108 to 17.892
   c. 10.321 to 17.679
   d. 11.009 to 16.991

Exhibit BB

$n = 36$　　$\bar{x} = 24.6$　　$S = 12$　　H_0: $\mu \leq 20$
H_a: $\mu > 20$

9. Refer to Exhibit BB. The test statistic is
   a. 2.3
   b. 0.38
   c. -2.3
   d. -0.38

10. Refer to Exhibit BB. The *p*-value is between
    a. 0.005 to 0.01
    b. 0.01 to 0.025
    c. 0.025 to 0.05
    d. 0.05 to 0.10

11. Refer to Exhibit BB. If the test is done at 95% confidence, the null hypothesis should
    a. not be rejected
    b. be rejected
    c. Not enough information is given to answer this question.
    d. None of these alternatives is correct.

Exhibit CC

A random sample of 16 students selected from the student body of a large university had an average age of 25 years and a standard deviation of 2 years. We want to determine if the average age of all the students at the university is significantly more than 24. Assume the distribution of the population of ages is normal.

12. Refer to Exhibit CC. The test statistic is
    a. 1.96
    b. 2.00
    c. 1.645
    d. 0.05

13. Refer to Exhibit CC. The *p*-value is between
    a. .005 to .01
    b. .01 to .025
    c. .025 to .05
    d. .05 to .10

14. Given two unbiased point estimators of the same population parameter, the point estimator with the smaller variance is said to have
    a. smaller relative efficiency
    b. greater relative efficiency
    c. smaller consistency
    d. larger consistency

15. A sample of 20 cans of tomato juice showed a standard deviation of 0.4 ounces. A 95% confidence interval estimate of the variance for the population is
   a. 0.2313 to 0.8533
   b. 0.2224 to 0.7924
   c. 0.0889 to 0.3169
   d. 0.0925 to 0.3413

Exhibit DD

When individuals in a sample of 150 were asked whether or not they supported capital punishment, the following information was obtained.

Do you support capital punishment?	Number of individuals
Yes	40
No	60
No Opinion	50

We are interested in determining whether or not the opinions of the individuals (as to Yes, No, and No Opinion) are uniformly distributed.

16. Refer to Exhibit DD. The calculated value for the test statistic equals
   a. 2
   b. -2
   c. 20
   d. 4

17. Refer to Exhibit DD. The number of degrees of freedom associated with this problem is
   a. 150
   b. 149
   c. 2
   d. 3

18. Refer to Exhibit DD. The *p*-value is
   a. larger than 0.1
   b. less than 0.1

c. less than 0.05
d. larger than 0.9

Exhibit EE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Treatments	2,073.6	4		
Between Blocks	6,000	5	1,200	
Error		20	288	
Total		29		

19. Refer to Exhibit EE. The sum of squares due to error equals
a. 14.4
b. 2,073.6
c. 5,760
d. 6,000

20. Refer to Exhibit EE. The test statistic to test the null hypothesis equals
a. 0.432
b. 1.8
c. 4.17
d. 28.8

21. Refer to Exhibit EE. The null hypothesis is to be tested at the 5% level of significance. The *p*-value is
a. greater than 0.10
b. between 0.10 to 0.05
c. between 0.05 to 0.025
d. between 0.025 to 0.01

22. An experimental design that permits statistical conclusions about two or more factors is a
a. randomized block design
b. factorial design

c. completely randomized design
d. randomized design

23. Correlation analysis is used to determine
a. the equation of the regression line
b. the strength of the relationship between the dependent and the independent variables
c. a specific value of the dependent variable for a given value of the independent variable
d. None of these alternatives is correct.

24. In a regression and correlation analysis if $r^2 = 1$, then
a. SSE must also be equal to one
b. SSE must be equal to zero
c. SSE can be any positive value
d. SSE must be negative

25. In a regression analysis if SSE = 200 and SSR = 300, then the coefficient of determination is
a. 0.6667
b. 0.6000
c. 0.4000
d. 1.5000

編號： 89

國立成功大學 110 學年度碩士班招生考試試題

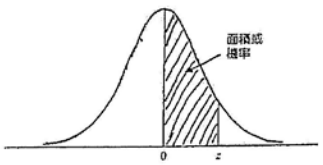
系　　所：資源工程學系

考試科目：統計學

考試日期：0202，節次：3

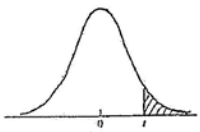
※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

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	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　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

編號： 89

國立成功大學 110 學年度碩士班招生考試試題

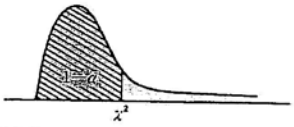
系　　所：資源工程學系

考試科目：統計學

考試日期：0202，節次：3

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

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

編號： 89

國立成功大學 110 學年度碩士班招生考試試題

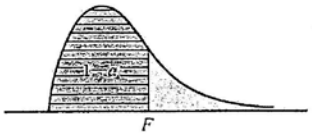
系　　所：資源工程學系

考試科目：統計學

考試日期：0202，節次：3

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

附表 F 分配



$1-\alpha = 0.95$

ν_2 \ ν_1	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