

國立中央大學九十學年度碩士班研究生入學試題卷

所別: 人力資源管理研究所 乙組 科目: 統計學 共 3 頁 第 1 頁

計算題 (每個答案 5 分)

1. Suppose that the following contingency table was set up:

	B	B'
A	10	30
A'	25	35

- (a) What was the probability of event A?
(b) What was the probability of event A' and B' ?
(c) What was the probability of event A' or B' ?
2. Suppose that the manager of a paint supply store wants to estimate the actual amount of paint contained in 1-gallon cans purchased from a nationally known manufacturer. It is known from the manufacturer's specifications that the standard deviation of the amount of paint is equal to 0.02 gallon. A random sample of 50 cans is selected, and the average amount of paint per 1-gallon can is 0.995 gallon.
- (a) Set up a 99% confidence interval estimate of the true population average amount of paint included in a 1-gallon can.
(b) On the basis of your results, do you think that the store owner has a right to complain to the manufacturer? Why?
(c) Does the population amount of paint per can have to be normally distributed here? Explain.
3. If, in a sample of size $n = 16$ selected from an underlying normal population, the sample mean is $\bar{X} = 56$ and the sample standard deviation is $S = 12$, what is the value of the t-test statistic if we are testing the null hypothesis H_0 that $\mu = 50$?
4. The personnel director of a large insurance company is interested in reducing the turnover rate of data processing clerks in the first year of employment. Past records indicate that 25% of all new hires in this area are no longer employed at the end of 1 year. Extensive new training approaches are implemented for a sample of 150 new data processing clerks. At the end of a 1-year period, 29 of these individuals are no longer employed.
- (a) At .01 level of significance, is there evidence that the proportion of data processing clerks who have gone through the new training and are no longer employed is less than 25%?
(b) Compute the p -value and interpret its meaning.
(c) What is your answer to (a) if 22 of the individuals are no longer employed?

參考用

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5. A breeder of thoroughbred horses wishes to model the relationship between the gestation period and the length of life of a horse. The breeder believes that the two variables may follow a linear trend. The information in the table was supplied to the breeder from various thoroughbred stables across the state.

Horse	Gestation Period x (days)	Life Length y (years)
1	416	24
2	279	25.5
3	298	20
4	307	21.5
5	356	22
6	403	23.5
7	265	21

- (a) Fit a least squares line to this data.
 (b) According to your least squares line, approximately how long would you expect a horse to live whose gestation period was 400 days?
 (c) Calculate SSE
 (d) Calculate s^2 .
6. A partially completed ANOVA summary for a completely randomized design is shown in the table.

Source	df	SS	MS	F
Treatments	6	16.9	③	⑤
Error	①	②	④	
Total	41	45.2		

- (a) Complete the ANOVA table.
 (b) How many treatments are involved in the experiment?
 (c) Do the data provide sufficient evidence to indicate a difference among the population means? Test using $\alpha = .10$.
 (d) Suppose that $\bar{x}_1 = 3.7$ and $\bar{x}_2 = 4.1$. Do the data provide sufficient evidence to indicate a difference between μ_1 and μ_2 ? Assume that there are seven observations for each treatment. Test using $\alpha = .10$.
 (e) Refer to part (d). Find a 90% confidence interval for $(\mu_1 - \mu_2)$.
 (f) Refer to part (d). Find a 90% confidence interval for μ_1 .

※附表：

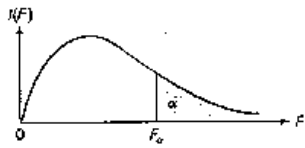
CONFIDENCE LEVEL 100(1- α)	α	$\alpha/2$	$Z_{\alpha/2}$
90%	.10	.05	1.645
95%	.05	.025	1.96
99%	.01	.005	2.575



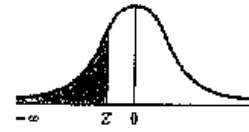
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Percentage Points of the F Distribution, $\alpha = .10$



The Cumulative Standardized Normal Distribution



α	NUMERATOR DEGREES OF FREEDOM								
	1	2	3	4	5	6	7	8	9
1	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86
2	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38
3	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24
4	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94
5	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32
6	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96
7	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72
8	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56
9	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44
10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35
11	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27
12	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21
13	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16
14	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12
15	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09
16	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06
17	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03
18	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00
19	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98
20	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96
21	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.93
22	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93
23	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92
24	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91
25	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89
26	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88
27	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91	1.87
28	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87
29	2.89	2.50	2.28	2.15	2.06	1.99	1.93	1.89	1.86
30	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85
40	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79
60	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74
120	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68
∞	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63

Entry represents area under the cumulative standardized normal distribution from $-\infty$ to Z

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.0000	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.8	.0007	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005
-3.7	.0011	.0010	.0010	.0010	.0009	.0009	.0009	.0008	.0008	.0008
-3.6	.0016	.0015	.0015	.0014	.0014	.0013	.0013	.0012	.0012	.0011
-3.5	.0023	.0022	.0022	.0021	.0021	.0020	.0020	.0019	.0018	.0017
-3.4	.0034	.0032	.0031	.0030	.0029	.0028	.0028	.0027	.0026	.0025
-3.3	.0048	.0047	.0045	.0044	.0043	.0042	.0041	.0040	.0039	.0038
-3.2	.0066	.0064	.0063	.0062	.0061	.0060	.0059	.0058	.0057	.0056
-3.1	.0089	.0087	.0086	.0085	.0084	.0083	.0082	.0081	.0080	.0079
-3.0	.0113	.0111	.0110	.0109	.0108	.0107	.0106	.0105	.0104	.0103
-2.9	.0149	.0146	.0145	.0144	.0143	.0142	.0141	.0140	.0139	.0138
-2.8	.0199	.0195	.0194	.0193	.0192	.0191	.0190	.0189	.0188	.0187
-2.7	.0268	.0264	.0263	.0262	.0261	.0260	.0259	.0258	.0257	.0256
-2.6	.0351	.0346	.0345	.0344	.0343	.0342	.0341	.0340	.0339	.0338
-2.5	.0451	.0445	.0444	.0443	.0442	.0441	.0440	.0439	.0438	.0437
-2.4	.0571	.0564	.0563	.0562	.0561	.0560	.0559	.0558	.0557	.0556
-2.3	.0713	.0705	.0704	.0703	.0702	.0701	.0700	.0699	.0698	.0697
-2.2	.0881	.0871	.0870	.0869	.0868	.0867	.0866	.0865	.0864	.0863
-2.1	.1078	.1066	.1065	.1064	.1063	.1062	.1061	.1060	.1059	.1058
-2.0	.1309	.1295	.1294	.1293	.1292	.1291	.1290	.1289	.1288	.1287
-1.9	.1587	.1571	.1570	.1569	.1568	.1567	.1566	.1565	.1564	.1563
-1.8	.1915	.1897	.1896	.1895	.1894	.1893	.1892	.1891	.1890	.1889
-1.7	.2303	.2283	.2282	.2281	.2280	.2279	.2278	.2277	.2276	.2275
-1.6	.2753	.2730	.2729	.2728	.2727	.2726	.2725	.2724	.2723	.2722
-1.5	.3266	.3240	.3239	.3238	.3237	.3236	.3235	.3234	.3233	.3232
-1.4	.3843	.3814	.3813	.3812	.3811	.3810	.3809	.3808	.3807	.3806
-1.3	.4472	.4440	.4439	.4438	.4437	.4436	.4435	.4434	.4433	.4432
-1.2	.5153	.5119	.5118	.5117	.5116	.5115	.5114	.5113	.5112	.5111
-1.1	.5888	.5851	.5850	.5849	.5848	.5847	.5846	.5845	.5844	.5843
-1.0	.6674	.6634	.6633	.6632	.6631	.6630	.6629	.6628	.6627	.6626
-0.9	.7500	.7457	.7456	.7455	.7454	.7453	.7452	.7451	.7450	.7449
-0.8	.8369	.8323	.8322	.8321	.8320	.8319	.8318	.8317	.8316	.8315
-0.7	.9270	.9220	.9219	.9218	.9217	.9216	.9215	.9214	.9213	.9212
-0.6	1.0200	1.0146	1.0145	1.0144	1.0143	1.0142	1.0141	1.0140	1.0139	1.0138
-0.5	1.1153	1.1095	1.1094	1.1093	1.1092	1.1091	1.1090	1.1089	1.1088	1.1087
-0.4	1.2129	1.2068	1.2067	1.2066	1.2065	1.2064	1.2063	1.2062	1.2061	1.2060
-0.3	1.3127	1.3063	1.3062	1.3061	1.3060	1.3059	1.3058	1.3057	1.3056	1.3055
-0.2	1.4145	1.4078	1.4077	1.4076	1.4075	1.4074	1.4073	1.4072	1.4071	1.4070
-0.1	1.5183	1.5113	1.5112	1.5111	1.5110	1.5109	1.5108	1.5107	1.5106	1.5105
-0.0	1.6241	1.6167	1.6166	1.6165	1.6164	1.6163	1.6162	1.6161	1.6160	1.6159

Source: From M. Merrington and C. M. Thompson, "Tables of Percentage Points of the Inverted Beta (F)-Distribution," *Biometrika*, 1943, 33, 73-88. Reproduced by permission of the Biometrika Trustees.

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