國立彰化師範大學 100 學年度碩士班招生考試試題

系所：企業管理學系　　科目：統計學

☆☆請在答案紙上作答☆☆　　共 4 頁，第 1 頁

I. Multiple Choices (50%)

1. If there are two unbiased estimators of a population parameter available, the one that has the smallest variance is said to be:
   (A) a biased estimator. (B) relatively efficient. (C) consistent. (D) relatively unbiased
2. If A and B are any two events with P(A) = .8 and P(B|A^c) = .7, then P(A^c and B) is
   (A) 0.56 (B) 0.14 (C) 1.50 (D) None of these choices.
3. A test is being conducted to test the differences between two population means using data that are gathered from a matched pairs experiment. If the paired differences are normal, then the distribution used for testing is the:
   (A) normal distribution. (B) binomial distribution.
   (C) Student t-distribution. (D) F-distribution.
4. The librarian at the Library of Congress has asked her assistant for an interval estimate of the mean number of books checked out each day. The assistant took a sample and found the mean to be 880 books. She provides the librarian with an interval estimate of between 790 and 970 books checked out per day. An efficient, unbiased point estimate of the number of books checked out each day at the Library of Congress is:
   (A) 790 (B) 880 (C) 90 (D) None of these choices.
5. Given that X is a binomial random variable with very large n, the binomial probability P(X ≤ 5) is approximated by the area under a normal curve to the left of
   (A) 5 (B) -5 (C) 5.5 (D) 4.5
6. If the events A and B are independent with P(A) = 0.30 and P(B) = 0.40, then the probability that both events will occur simultaneously is:
   (A) 0 (B) 0.12 (C) 0.70 (D) Not enough information to tell.
7. If X and Y are any random variables with E(X) = 5, E(Y) = 6, E(XY) = 21, V(X) = 9 and V(Y) = 10, then the relationship between X and Y is a:
   (A) strong positive relationship (B) strong negative relationship
   (C) weak positive relationship (D) weak negative relationship
8. If A and B are independent events with P(A) = 0.60 and P(A|B) = 0.60, then P(B) is:
   (A) 1.20 (B) 0.60 (C) 0.36 (D) cannot be determined with the information given
9. How does conducting multiple t-tests compare to conducting a single F-test?
   (A) Multiple t-tests increase the chance of a Type I error.
   (B) Multiple t-tests decrease the chance of a Type I error.
   (C) Multiple t-tests do not affect the chance of a Type I error.
   (D) This comparison cannot be made without knowing the number of populations.

10. If two random samples (x_1, x_2) of sizes 30 and 36 are selected independently from two populations with means 78 and 85, and standard deviations 12 and 15, respectively, then the mean of the difference $\bar{x}_1 - \bar{x}_2$ is equal to:
(A) -7 (B) 7 (C) 1.17 (D) 0.24

II. Short Answer (50%)

1. A marketing consultant was in the process of studying the perceptions of married couples concerning their weekly food expenditures. He believed that the husband's perception would be higher than the wife's. To judge his belief, he takes a random sample of ten married couples and asks each spouse to estimate the family food expenditure (in dollars) during the previous week. The data are shown below. Can the consultant conclude at the 5% significance level that the husband's estimate is higher than the wife's estimate? (10%)

Couple	Husband	Wife
1	380	270
2	280	300
3	215	185
4	350	320
5	210	180
6	410	390
7	250	250
8	360	320
9	180	170
10	400	330

2. Random samples from two normal populations produced the following statistics:n_1=10,s_1^2=32, n_2=15,, and s_2^2=22. Is there enough evidence at the 5% significance level to infer that the variance of Population 1 is larger than the variance of Population 2? (10%)

3. A statistician estimated the multiple regression model

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$$

with 45 observations. The computer output is shown below. However, because of a printer malfunction, some of the results are not shown. These are indicated by the boldface letters ***a*** to ***j***. Fill in the missing results (up to three decimal places). (20%)

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Predictor	*Coef*	*StDev*	*T*
Constant	***a***	3.51	2.03
x_1	21.6	***b***	4.73
x_2	-12.5	7.61	***c***

S = ***d***　　R-Sq = ***e***

ANALYSIS OF VARIANCE

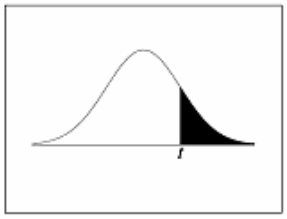
Source of Variation	*df*	*SS*	*MS*
Regression	***f***	***i***	***j***
Error	***g***	388	9.238
Total	***h***	519	

4. The probability that a patient recovers from a rare blood disease is 0.4. (10%)

(1) If 100 people are known to have contracted this disease, what is the probability that less than 30 survive?

(2) If 100 people are known to have contracted this disease, what is the probability that exactly 35 survive?

t-Distribution Table



The shaded area is equal to α for $t = t_\alpha$.

df	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
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

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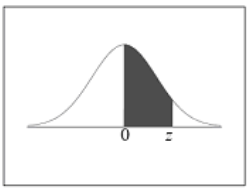
F-Distribution Table

d_2 \ d_1	1	2	3	4	5	6	7	8	9
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5
2	18.51	19.00	19.16	19.25	19.3	19.33	19.35	19.37	19.38
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28

Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952