國立彰化師範大學107學年度碩士班招生考試試題

系所：企業管理學系(選考丙)　　科目：統計學

企業管理學系行銷與流通管理碩士班(選考丙)

☆☆請在答案紙上作答☆☆　　

I. Multiple Choices Questions (60%)

1. When Kathy enters a grocery store, there are three simple events: buy nothing, buy a small amount, or buy a large amount. In this situation, if Kathy buys a small amount, she cannot also buy a large amount or buy nothing. Thus the three events are:
   (A) mutually exclusive　　(B) not mutually exclusive
   (C) dependent events　　(D) independent events

2. A posterior probability value is a prior probability value that has been:
   (A) modified on the basis of new information.
   (B) multiplied by a conditional probability value.
   (C) divided by a conditional probability value.
   (D) added to a conditional probability value.

3. On the average, 1.5 customers per minute arrive at any one of the checkout counters of Land food market. What type of probability distribution can be used to find out the probability that there will be no customers arriving at a checkout counter in 10 minutes?
   (A) Poisson distribution　　(B) Normal distribution
   (C) Binomial distribution　　(D) None of these choices

4. In an attempt to minimize no-shows on high-demand days a golf course has implemented an online check-in procedure. Preliminary results indicate that once a golfer has checked in, there is only at 20% chance that he or she will be a no-show. Each no-show event is independent to the other. If 15 golfers have checked in using this process, what is the probability there will be at least 4 no-shows among them?
   (A) 0.1876　　(B) 0.2501　　(C) 0.3519　　(D) 0.6481

5. A bank has an average balance of $495 and a standard deviation of $102, in its checking accounts. What is the probability that 36 randomly selected accounts have an average balance greater than $500?
   (A) 0.7718　　(B) 0.3885　　(C) 0.6115　　(D) 0.228

6. If the sample size is cut to 1/4 of its present size, all else being the same, the confidence interval will become:
   (A) Twice as wide　　(B) Half as wide
   (C) Four times as wide　　(D) Will not change

7. In a left-tailed hypothesis test involving a normally distributed population with a known standard deviation, the computed test statistic was Z = –1.74. If the null hypothesis is rejected based on this evidence, the risk of making a _____ error is approximately _____.
   (A) Type I; 4.1%　　(B) Type II; 4.1%
   (C) Type I; 95.9%　　(D) Type II; 95.9%

8. Suppose that a paired-sample test for the difference between two population means is appropriate. In this situation, the use of an independent samples test will:
   (A) Increase α　　(B) Reduce α
   (C) Increase β　　(D) Both A and C

9. Craps is a popular casino game in which players bet on rolls of two fair, six-sided dice. A popular bet is the so-called "Field Bet", a single-roll bet in which the player wins if a 2, 3, 4, 9, 10, 11 or 12 is thrown. There are 36 possible combinations of two fair. What is the probability of winning on any single "Field Bet"?
   (A) Not more than 0.3
   (B) More than 0.3 but not more than 0.4
   (C) More than 0.4 but not more than 0.5
   (D) More than 0.5 but not more than 0.6

10. Sunshine Inns, a national hotel chain, buys mattresses from only two firms. Because Supplier A's defect rate (3%) is twice that of Supplier B, Sunshine buys three-fourths of its mattresses from Supplier B.
    Suppose a mattress has been found to be defective. What is the probability it was produced by Supplier B?
    (A) 0.01125　(B) 0.3　(C) 0.6　(D) 0.75

11. Which of the following correctly describes the treatment sum of squares in one-way ANOVA?
    (A) It equals the sum of the squared deviations between each treatment sample mean and the grand mean, multiplied by the number of observations made for each treatment.
    (B) It equals the sum of the square deviations between each block sample mean and the grand mean, multiplied by the number of observations made for each block, multiplied by the number of observations per cell.
    (C) It equals the number of rows (or columns) multiplied by the sum of the squared deviations of the column-block sample means from the grand mean.
    (D) It equals the number of columns (or rows) multiplied by the sum of the squared deviations of the row-block sample means from the grand mean.

12. Which of the following statements is true in a one-way ANOVA?
    (A) The critical value of the test will be a value obtained from the F-distribution.
    (B) If the null hypothesis is rejected, it may still be possible that two or more of the population means equal.
    (C) The degrees of freedom associated with the sum of squares for treatments is equal to one less than the number of populations.
    (D) All of these.

13. Which of the following is not an assumption for the simple linear regression model?
   (A) The distribution of the error terms will be skewed to left or right depending on the values of the dependent variable.
   (B) The error terms have equal variances for all values of the independent variable.
   (C) The error terms are independent of each other.
   (D) The mean of the dependent variable for all levels of the independent variable can be connected by a straight line.

14. Which of the following statements is true?
   (A) In a simple linear regression model, if the regression slope coefficient is negative, then the standard error of the estimate will be positive.
   (B) In a simple linear regression model, the regression slope coefficient will have the same sign as the correlation coefficient.
   (C) If two variables are determined to be correlated, there is no reason to believe that the regression model involving the same two variables will be statistically significant.
   (D) All of these.

15. A study of 20 students showed that the correlation between the time spent writing a test and the number of hours studied the night before the test was 0.35. Using a level of significance equal to 0.05, which of the following statements is true?
   (A) The sample correlation coefficient could be zero since the test statistic does not fall in the rejection region.
   (B) The null hypothesis that the population mean is equal to zero should not be rejected, and we should conclude that the true correlation coefficient is zero.
   (C) There is not enough statistical evidence to conclude that the true correlation coefficient is different from zero.
   (D) The null hypothesis that the population variance is equal to zero should be rejected, and we should conclude that the true correlation coefficient is zero.

16. In regression analysis we use the Spearman rank correlation coefficient to measure and test to determine whether a relationship exists between the two variables if:
   (A) one or both variables may be ordinal.
   (B) both variables are interval but the normality requirement is not met.
   (C) both one or both variables may be ordinal and both variables are interval but the normality requirement is not met.
   (D) neither one or both variables may be ordinal nor both variables are interval but the normality requirement is not met.

17. In a multiple regression analysis, if the model provides a poor fit, this indicates:
   (A) that the sum of squares for error (SSE) will be large.
   (B) that the standard error of estimate will be large.
   (C) that the multiple will be close to zero.
   (D) all of these.

18. Which of the following correctly describes a p-value?
   (A) It gives the partial change in Y for a unit change in an independent variable, while holding other independent variables constant.
   (B) It equals the probability of being true, given the claim. The true regression coefficient equals 0.
   (C) It is an index of the degree of linear association among more than two variables, equal to the square root of the sample coefficient of multiple determination.
   (D) It equals the ration of an estimated partial-regression coefficient to its standard error.

19. Which of the following statements is true?
   (A) The R^2 value will tend to be smaller than the adjusted R^2 value when insignificant independent variables are included in the model.
   (B) The y -intercept will usually be negative in a multiple regression model when the regression slope coefficients are positive.
   (C) If the confidence interval estimate for the regression slope coefficient, based on the sample information, crosses over zero, then the true population regression slope coefficient could be zero.
   (D) The x-intercept will usually be positive in a multiple regression model when the regression slope coefficients are negative.

20. Which of the following statements is true?
   (A) Nonparametric methods can be applied to a wider variety of problems because they have more rigid requirements than parametric methods.
   (B) Nonparametric methods can be applied to a wider variety of problems because they have less rigid requirements than parametric methods.
   (C) Unlike parametric methods, nonparametric methods cannot be applied to nominal data that lack numeric values.
   (D) Nonparametric methods can be applied to a wider variety of problems because they have less rigid requirements than parametric methods and unlike parametric methods, nonparametric methods cannot be applied to nominal data that lack numeric values.

II. Short Answer Questions (40%)

1. A commercial bank wants to lower the fluctuations in its deposit holdings and announces a minimum amount required to be held in its checking accounts. The variance in 16 of its accounts before the minimum limit was 2,500 dollars and after the change it is 2,025 dollars. Has the change in policy decreased the variance of account holdings? Assume $\alpha = 0.05$. (10%)

2. A manufacturing firm uses two different processes to evaluate the quality of incoming components of a particular class. In a recent test of the processes' effectiveness, a random sample was taken consisting of 5,000 components, 2,500 that had been evaluated by process A and 2,500 that had been evaluated by process B. Of the 2,500 that had been evaluated by process A, 87 had been misclassified. Process B generated 65 misclassifications in its sample. Assume also that α is set at 0.05.

   (1) Is there sufficient evidence to conclude that process B leads to a lower miscalculation rate? (5%)
   (2) What is the p-value for the observed test statistic in this instance? (5%)

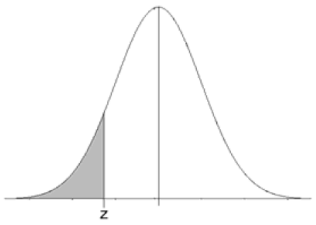
3. A consumer organization was concerned about the differences between the advertised sizes of containers and the actual amount of product. In a preliminary study, six packages of three different brands of margarine that are supposed to contain 500ml were measured. The differences from 500ml are listed here.

Brand 1	Brand 2	Brand 3
1	2	1
3	2	2
3	4	4
0	3	2
1	0	3
0	4	4

   (A) Do these data provide sufficient evidence to conclude that differences exist between the three brands? Use $\alpha = 0.01$. (5%)
   (B) Apply Tukey's method to determine which brands differ in these three brands of margarine. (5%)
   (**Hint:** $P(F>F_{0.01,3,15})=5.42$; $P(F>F_{0.01,2,15})=6.36$; $q_{0.05}(3,15)=3.67$; $q_{0.05}(2,15)=2.38$)

4. An urn contains 10 chips. An unknown number of the chips are white; the others are red. We wish to test $\boldsymbol{H_0}$: exactly half the chips are white versus $\boldsymbol{H_1}$**:** more than half the chips are white. We draw, without replacement, three chips and reject $\boldsymbol{H_0}$ if two or more are white.
   (A) Find the type I error rate. (5%)
   (B) Find type II error rate when the urn is 70% white. (5%)

Standard Normal Cumulative Probability Table



Cumulative probabilities for NEGATIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

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F Table (α=0.05)

Upper 5% points

ν_2 \ ν_1	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
15	4·54	3·68	3·29	3·06	2·90	2·79	2·71	2·64	2·59	2·54	2·48	2·40	2·33	2·29	2·25	2·20	2·16	2·11	2·07
16	4·49	3·63	3·24	3·01	2·85	2·74	2·66	2·59	2·54	2·49	2·42	2·35	2·28	2·24	2·19	2·15	2·11	2·06	2·01
17	4·45	3·59	3·20	2·96	2·81	2·70	2·61	2·55	2·49	2·45	2·38	2·31	2·23	2·19	2·15	2·10	2·06	2·01	1·96
18	4·41	3·55	3·16	2·93	2·77	2·66	2·58	2·51	2·46	2·41	2·34	2·27	2·19	2·15	2·11	2·06	2·02	1·97	1·92
19	4·38	3·52	3·13	2·90	2·74	2·63	2·54	2·48	2·42	2·38	2·31	2·23	2·16	2·11	2·07	2·03	1·98	1·93	1·88
20	4·35	3·49	3·10	2·87	2·71	2·60	2·51	2·45	2·39	2·35	2·28	2·20	2·12	2·08	2·04	1·99	1·95	1·90	1·84
21	4·32	3·47	3·07	2·84	2·68	2·57	2·49	2·42	2·37	2·32	2·25	2·18	2·10	2·05	2·01	1·96	1·92	1·87	1·81
22	4·30	3·44	3·05	2·82	2·66	2·55	2·46	2·40	2·34	2·30	2·23	2·15	2·07	2·03	1·98	1·94	1·89	1·84	1·78
23	4·28	3·42	3·03	2·80	2·64	2·53	2·44	2·37	2·32	2·27	2·20	2·13	2·05	2·01	1·96	1·91	1·86	1·81	1·76
24	4·26	3·40	3·01	2·78	2·62	2·51	2·42	2·36	2·30	2·25	2·18	2·11	2·03	1·98	1·94	1·89	1·84	1·79	1·73
25	4·24	3·39	2·99	2·76	2·60	2·49	2·40	2·34	2·28	2·24	2·16	2·09	2·01	1·96	1·92	1·87	1·82	1·77	1·71
26	4·23	3·37	2·98	2·74	2·59	2·47	2·39	2·32	2·27	2·22	2·15	2·07	1·99	1·95	1·90	1·85	1·80	1·75	1·69
27	4·21	3·35	2·96	2·73	2·57	2·46	2·37	2·31	2·25	2·20	2·13	2·06	1·97	1·93	1·88	1·84	1·79	1·73	1·67
28	4·20	3·34	2·95	2·71	2·56	2·45	2·36	2·29	2·24	2·19	2·12	2·04	1·96	1·91	1·87	1·82	1·77	1·71	1·65
29	4·18	3·33	2·93	2·70	2·55	2·43	2·35	2·28	2·22	2·18	2·10	2·03	1·94	1·90	1·85	1·81	1·75	1·70	1·64
30	4·17	3·32	2·92	2·69	2·53	2·42	2·33	2·27	2·21	2·16	2·09	2·01	1·93	1·89	1·84	1·79	1·74	1·68	1·62
40	4·08	3·23	2·84	2·61	2·45	2·34	2·25	2·18	2·12	2·08	2·00	1·92	1·84	1·79	1·74	1·69	1·64	1·58	1·51
60	4·00	3·15	2·76	2·53	2·37	2·25	2·17	2·10	2·04	1·99	1·92	1·84	1·75	1·70	1·65	1·59	1·53	1·47	1·39
120	3·92	3·07	2·68	2·45	2·29	2·17	2·09	2·02	1·96	1·91	1·83	1·75	1·66	1·61	1·55	1·50	1·43	1·35	1·25
∞	3·84	3·00	2·60	2·37	2·21	2·10	2·01	1·94	1·88	1·83	1·75	1·67	1·57	1·52	1·46	1·39	1·32	1·22	1·00