註：◎ 每題配分 10%。

◎ **第一至五題含複選題**，答案完全正確才給分；

第六至十題為單選題，必須列出計算過程與結果，否則不予給分。

◎ 資料或條件不足時，請自行假設。

一、 Which of the following statements regarding to the central limit theorem is (are) correct?

(A) Population distribution will approach normal distribution when sample size is large

(B) If we take a large number of samples from a normally distributed population, the distribution of the sample means will approach the standard normal distribution

(C) For any population, the sampling distribution of sample means will approach normal distribution regardless of the sample size

(D) Increasing the sample size causes the sampling distribution of $\hat{p}$ to have more dispersion

(E) None of the above.

二、 Which of the following statements is (are) true?

(A) When a null hypothesis is rejected, the probability of committing a Type II error is 0

(B) Increasing the value of α increases the value of β

(C) A large value for the power at a specific value of the alternative hypothesis indicates a small value for the probability of a type II error, given the specified value stated in the alternative hypothesis

(D) Type I error and Type II error could exist at the same time

(E) None of the above.

三、 Which of the following statements regarding to multiple regression analysis is (are) not correct?

(A) The value of coefficient of determination is less than or equal to the value of coefficient of correlation.

(B) If $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$, then the response surface of this model is a plane

(C) A large value of unadjusted coefficient of determination does not imply that the fitted model is a useful one

(D) The adjusted coefficient of determination must be smaller than or equal to the unadjusted coefficient of determination in a same regression model

(E) None of the above.

四、 Which of the following is (are) not a required assumption for one-way ANOVA?

(A) The sample size must be equal

(B) The population must all be normally distributed

(C) The population variances must be equal

(D) The samples for each treatment must be selected randomly and independently

(背面仍有題目,請繼續作答)

(E) None of the above.

五、 Which of the following statements is (are) correct if multicollinearity exists in a multiple regression model?

(A) The independent and dependent variables are highly correlated

(B) Standard errors of the coefficient estimates for the correlated predictor variables will increase

(C) The value of coefficient estimates for the correlated predictor variables will increase

(D) P value of coefficient estimates for the correlated predictor variables will decrease

(E) None of the above.

六、 Two phone numbers A and B are owned by a company. If 80% of the time for line A and 60% of the time for line B is busy, the free time of the two lines is independent, what is the probability that at least one of the two lines is busy on a given time?

(A) Between 0.80 and 0.85

(B) Between 0.85 and 0.90

(C) Between 0.90 and 0.95

(D) Between 0.95 and 1.00

(E) None of the above.

七、 X is a random variable with uniform probability distribution. Its probability density function is

$$f(x) = \begin{cases} 1/20 & for \;\; 20 \le x \le 40 \\ 0 & elsewhere \end{cases}$$

The variance of X is

(A) between 25 and 30

(B) between 30 and 35

(C) between 45 and 50

(D) between 50 and 55

(E) none of the above.

八、 The time between arrivals of vehicles at a particular interaction follows an exponential probability distribution with a mean of 12 seconds. The probability that there will be 24 or more seconds between arriving vehicles is

(A) between 0.10 and 0.15

(B) between 0.15 and 0.20

(C) between 0.20 and 0.25

(D) between 0.25 and 0.30

(E) none of the above.

九、 A company has an average of 250 one-page photocopy tasks per day with standard deviation of 25. A task is failed when insufficient papers. The company sets a target of failure rate at 1%.

Assume the number of tasks is normally distributed, how many pieces of paper should be prepared?

(A) Between 286 and 290

(B) Between 291 and 295

(C) Between 296 and 300

(D) Between 301 and 305

(E) None of the above.

十、 The records show that 52 men in a sample of 1000 men versus 23 women in a sample of 1000 women bought the new brand cellular phone. Do these data present sufficient evidence to indicate the rate of buying new brand cellular phone among men is greater than that among women by 0.025?

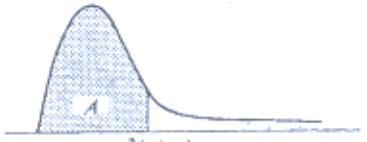
(A) The rate of buying new brand cellular phone among men is greater than that among women by 0.025

(B) No sufficient evidence to indicate the rate of buying new brand cellular phone among men is greater than that among women by 0.025

(C) Not enough information is provided to answer this question

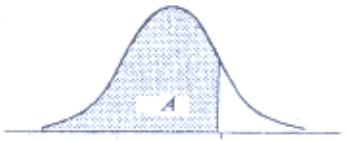
(D) None of the above.

Entry is $\chi^2(A; \nu)$ where $P\{\chi^2(\nu) \leq \chi^2(A; \nu)\} = A$.



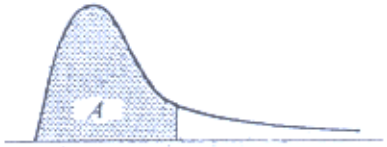
ν	A = .005	.010	.025	.050	.100	.900	.950	.975	.990	.995
1	0.0^4393	0.0^3157	0.0^3982	0.0^2393	0.0158	2.71	3.84	5.02	6.63	7.88
2	0.0100	0.0201	0.0506	0.103	0.211	4.61	5.99	7.38	9.21	10.60
3	0.072	0.115	0.216	0.352	0.584	6.25	7.81	9.35	11.34	12.84
4	0.207	0.297	0.484	0.711	1.064	7.78	9.49	11.14	13.28	14.86
5	0.412	0.554	0.831	1.145	1.61	9.24	11.07	12.83	15.09	16.75
6	0.676	0.872	1.24	1.64	2.20	10.64	12.59	14.45	16.81	18.55
7	0.989	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09	21.96
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21	25.19
11	2.60	3.05	3.82	4.57	5.58	17.28	19.68	21.92	24.73	26.76
12	3.07	3.57	4.40	5.23	6.30	18.55	21.03	23.34	26.22	28.30
13	3.57	4.11	5.01	5.89	7.04	19.81	22.36	24.74	27.69	29.82
14	4.07	4.66	5.63	6.57	7.79	21.06	23.68	26.12	29.14	31.32
15	4.60	5.23	6.26	7.26	8.55	22.31	25.00	27.49	30.58	32.80
16	5.14	5.81	6.91	7.96	9.31	23.54	26.30	28.85	32.00	34.27
17	5.70	6.41	7.56	8.67	10.09	24.77	27.59	30.19	33.41	35.72
18	6.26	7.01	8.23	9.39	10.86	25.99	28.87	31.53	34.81	37.16
19	6.84	7.63	8.91	10.12	11.65	27.20	30.14	32.85	36.19	38.58
20	7.43	8.26	9.59	10.85	12.44	28.41	31.41	34.17	37.57	40.00
21	8.03	8.90	10.28	11.59	13.24	29.62	32.67	35.48	38.93	41.40
22	8.64	9.54	10.98	12.34	14.04	30.81	33.92	36.78	40.29	42.80
23	9.26	10.20	11.69	13.09	14.85	32.01	35.17	38.08	41.64	44.18
24	9.89	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98	45.56
25	10.52	11.52	13.12	14.61	16.47	34.38	37.65	40.65	44.31	46.93
26	11.16	12.20	13.84	15.38	17.29	35.56	38.89	41.92	45.64	48.29
27	11.81	12.88	14.57	16.15	18.11	36.74	40.11	43.19	46.96	49.64
28	12.46	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28	50.99
29	13.12	14.26	16.05	17.71	19.77	39.09	42.56	45.72	49.59	52.34
30	13.79	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89	53.67
40	20.71	22.16	24.43	26.51	29.05	51.81	55.76	59.34	63.69	66.77
50	27.99	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15	79.49
60	35.53	37.48	40.48	43.19	46.46	74.40	79.08	83.30	88.38	91.95
70	43.28	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.4	104.2
80	51.17	53.54	57.15	60.39	64.28	96.58	101.9	106.6	112.3	116.3
90	59.20	61.75	65.65	69.13	73.29	107.6	113.1	118.1	124.1	128.3
100	67.33	70.06	74.22	77.93	82.36	118.5	124.3	129.6	135.8	140.2

Entry is $t(A; \nu)$ where $P\{t(\nu) \leq t(A; \nu)\} = A$



ν	A = .90	.95	.975	.99	.9925	.995	.9975
1	3.078	6.314	12.706	31.821	42.434	63.657	127.322
2	1.886	2.920	4.303	6.965	8.073	9.925	14.089
3	1.638	2.353	3.182	4.541	5.047	5.841	7.453
4	1.533	2.132	2.776	3.747	4.088	4.604	5.598
5	1.476	2.015	2.571	3.365	3.634	4.032	4.773
6	1.440	1.943	2.447	3.143	3.372	3.707	4.317
7	1.415	1.895	2.365	2.998	3.203	3.499	4.029
8	1.397	1.860	2.306	2.896	3.085	3.355	3.833
9	1.383	1.833	2.262	2.821	2.998	3.250	3.690
10	1.372	1.812	2.228	2.764	2.932	3.169	3.581
11	1.363	1.796	2.201	2.718	2.879	3.106	3.497
12	1.356	1.782	2.179	2.681	2.836	3.055	3.428
13	1.350	1.771	2.160	2.650	2.801	3.012	3.372
14	1.345	1.761	2.145	2.624	2.771	2.977	3.326
15	1.341	1.753	2.131	2.602	2.746	2.947	3.286
16	1.337	1.746	2.120	2.583	2.724	2.921	3.252
17	1.333	1.740	2.110	2.567	2.706	2.898	3.222
18	1.330	1.734	2.101	2.552	2.689	2.878	3.197
19	1.328	1.729	2.093	2.539	2.674	2.861	3.174
20	1.325	1.725	2.086	2.528	2.661	2.845	3.153
21	1.323	1.721	2.080	2.518	2.649	2.831	3.135
22	1.321	1.717	2.074	2.508	2.639	2.819	3.119
23	1.319	1.714	2.069	2.500	2.629	2.807	3.104
24	1.318	1.711	2.064	2.492	2.620	2.797	3.091
25	1.316	1.708	2.060	2.485	2.612	2.787	3.078
26	1.315	1.706	2.056	2.479	2.605	2.779	3.067
27	1.314	1.703	2.052	2.473	2.598	2.771	3.057
28	1.313	1.701	2.048	2.467	2.592	2.763	3.047
29	1.311	1.699	2.045	2.462	2.586	2.756	3.038
30	1.310	1.697	2.042	2.457	2.581	2.750	3.030
40	1.303	1.684	2.021	2.423	2.542	2.704	2.971
60	1.296	1.671	2.000	2.390	2.504	2.660	2.915
120	1.289	1.658	1.980	2.358	2.468	2.617	2.860
∞	1.282	1.645	1.960	2.326	2.432	2.576	2.807

Entry is $F(A;\ \nu_1,\ \nu_2)$ where $P\{F(\nu_1,\ \nu_2) \leq F(A;\ \nu_1,\ \nu_2)\} = A$



$F(A;\ \nu_1,\ \nu_2)$ A=0.95

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	4·96	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