系所別：資訊管理學系 甲、乙組　科目：統計學

請注意：答案請橫式書寫，並依序作答，違者各扣總分 3 分。選擇題與是非題每列限書寫 5 題答案。

一、單選題(每題 2 分，共 24 分)

1. The covariance
   a. Must be between −1 and +1
   b. Can be positive
   c. Can be positive or negative
   d. Must be less than +1

2. Given that $r_{AB} = 0.5$ when raw scores on variables A and B are used. What will the r be if each score was converted to a "percentage" scores?
   a. 0.00
   b. <0.50
   c. 0.50
   d. >0.50

3. A campus program evenly enrolls undergraduate and graduate students. If a random sample of 4 students is selected from the program to be interviewed about the introduction of a new fast food outlet on the ground floor of the campus building, what is the probability that all 4 students selected are undergraduate students?
   a. 0.0256
   b. 0.0625
   c. 0.16
   d. 0.0725

4. An insurance company has called a consulting firm to determine if the company has an unusually high number of false insurance claims. It is known that the industry proportion for false claims is 3%. The consulting firm has decided to randomly and independently sample 100 of the company's insurance claims. They believe the number of these 100 that are false will yield the information the company desires.
   a. Normal distribution
   b. Binomial distribution
   c. Poisson distribution
   d. Hypergeometric distribution

5. If the low-scoring examinees on A were removed, then r will be
   a. 0.00
   b. <0.50
   c. 0.50
   d. >0.50

6. $\Sigma(Y-Y')^2$ will be zero when
   a. r = 0
   b. r = +1 or −1
   c. $S_{y'} = 0$
   d. $S_{y'} = 1.00$

7. Researchers determined that 60 tissues is the average number of tissues used during a cold. Suppose a random sample of 100 Kleenex users yielded the following data on the number of tissues used during a cold: $\overline{X} = 52, S = 22$. Suppose the alternative we wanted to test was H_1: $\mu < 60$. State the correct rejection regions for $\alpha = 0.05$
   a. Reject H_0 if t > 1.6604
   b. Reject H_0 if t < -1.6604
   c. Reject H_0 if t > 1.9842 or Z < -1.9842
   d. Reject H_0 if t < -1.9842

8. It is possible to directly compare the results of a confidence interval estimate to the results obtained by testing a null hypothesis if
   a. A two-tailed test for μ is used
   b. A one-tailed test for μ is used
   c. Both of the previous statements are true
   d. None of the previous statements is true

9. In a study concerned with the relationship between X and Y, it is found that 64% of the variance in Y is associated with X. Thus r_{XY} must have been
   a. 0.64
   b. 0.80
   c. 0.08
   d. 0.09

10. Given a normal distribution with μ=50 and σ=5, if a sample of n=100 is selected, what is the probability that $\overline{X}$ is less than 47?
   a. virtually zero
   b. 0.01
   c. 0.15
   d. 0.95

11. If we have two independent random samples from normal distributions with variances σ_1^2 and σ_2^2, then $(S_1^2/\sigma_1^2)/(S_2^2/\sigma_2^2)$ have what distribution, where S^2 represents the sample variance?
   a. t distribution
   b. normal distribution
   c. χ^2 distribution
   d. F distribution

12. If in a sample of size n=16 selected from an underlying normal distribution population, the sample mean $\overline{X}$ =56 and the sample standard deviation is S=12, what is the value of the t-test statistic if you are testing the null hypothesis H_0 that μ =50
   a. 1
   b. 2.5
   c. 2
   d. 4

注意：背面有試題

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二、是非題(每題 2 分，共 10 分)

1. For a given level of significance, if the sample size is increase, the probability of committing a Type II error will increase.
2. If P(A and B) = 1, then A and B must be collectively exhaustive.
3. The p-value is the smallest value of α for which the null hypothesis can be rejected.
4. $\bar{Y}$ will have a sampling distribution that is approximately normal if the sample size is large. The formal statement of this result is called the central limit theorem.
5. If A and B are mutually exclusive events, then P(A∪B)=P(A)+P(B).

三、簡答與填充(共 16 分)

1. What is the difference between mutually exclusive events and collectively exhaustive events?(6 分)
2. A hotel chain has identically sized resorts in 5 locations. The data that follow resulted from analyzing the hotel occupancies on randomly selected days in the 5 locations.

Caymen	Pennkamp	California	Mayaguez	Maui
28	40	21	37	22
33	35	21	47	19
41	33	27	45	25

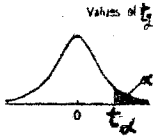
ANOVA table

Source	*df*	SS	MS	*F*	F_{crit}
Location	4	963.6	**A**	**B**	**C**
Error	**D**	210.0	**E**		
Total	**F**	**G**			

   a. Fill out the blanks of **A**, **B**, **C**, **D**, **E**, **F**, and **G**. (7 分)
   b. The value of the element in the ANOVA table that always provides an estimate of the population variance is ?(3 分)

四、計算題(共 50 分)

1. An anthropologist wishes to estimate the average height of men for a certain race of people. If the population standard deviation is assumed to be 2.5 inches and if she randomly samples 100 men, find the probability that difference between the sample mean and the true population mean will not exceed 0.5 inch. (8 分)
2. According to a recent *New York Times/CBS News* poll, 60% of the 1429 adults interviewed were unable to name an elected official whom they admired. Is there sufficient evidence to claim that a majority of adults are unable to name an elected official whom they admire? Use a 0.01 significance level. (10 分)
3. A chemical process has produced on the average, 800 tons of chemical per day. The daily yields for the past week are 785, 805, 790, 793, and 802 tons. Do these data indicate that the average yield is less than 800 tons, and hence that something is wrong with the process? Test at the 5% level of significance. What assumptions must be satisfied in order for the procedure you used to analyze these data to be valid? Give bounds for the associated p-value. (12 分)
4. Online customer service is a key element of online retailing. According to WSJ Market Data Group, 37.5% of Priceline.com customers take advantage of this service. If random samples of 200 Priceline.com customers are selected, what proportion of samples is likely to have between 35% and 40% who take advantage of online customer service? (8 分)
5. Suppose that patrons of a restaurant were asked whether they preferred beer or whether they preferred wine. 70% said that they preferred beer. 60% of the patrons were male. 80% of the males preferred beer.
   a. The probability a randomly selected patron prefers wine is? (2 分)
      Suppose a randomly selected patron prefers wine. Then the probability the patron is a male is? (5 分)
      Suppose a randomly selected patron is a female. Then the probability the patron prefers beer is? (5 分)

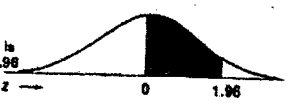


t

df	$t_{0.10}$	$t_{0.05}$	$t_{0.025}$	$t_{0.01}$	$t_{0.005}$	df
1	3.078	6.314	12.706	31.821	63.657	1
2	1.886	2.920	4.303	6.965	9.925	2
3	1.638	2.353	3.182	4.541	5.841	3
4	1.533	2.132	2.776	3.747	4.604	4
5	1.476	2.015	2.571	3.365	4.032	5
6	1.440	1.943	2.447	3.143	3.707	6
7	1.415	1.895	2.365	2.998	3.499	7
8	1.397	1.860	2.306	2.896	3.355	8
9	1.383	1.833	2.262	2.821	3.250	9
10	1.372	1.812	2.228	2.764	3.169	10
11	1.363	1.796	2.201	2.718	3.106	11
12	1.356	1.782	2.179	2.681	3.055	12
13	1.350	1.771	2.160	2.650	3.012	13
14	1.345	1.761	2.145	2.624	2.977	14
15	1.341	1.753	2.131	2.602	2.947	15
16	1.337	1.746	2.120	2.583	2.921	16
17	1.333	1.740	2.110	2.567	2.898	17
18	1.330	1.734	2.101	2.552	2.878	18
19	1.328	1.729	2.093	2.539	2.861	19
20	1.325	1.725	2.086	2.528	2.845	20
21	1.323	1.721	2.080	2.518	2.831	21
22	1.321	1.717	2.074	2.508	2.819	22
23	1.319	1.714	2.069	2.500	2.807	23
24	1.318	1.711	2.064	2.492	2.797	24
25	1.316	1.708	2.060	2.485	2.787	25
26	1.315	1.706	2.056	2.479	2.779	26
27	1.314	1.703	2.052	2.473	2.771	27
28	1.313	1.701	2.048	2.467	2.763	28
29	1.311	1.699	2.045	2.462	2.756	29
∞	1.282	1.645	1.960	2.326	2.576	∞

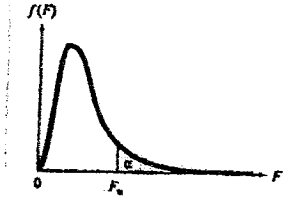
z

Example:
If $z = 1.96$, then .4750 of the area is between 0 and 1.96



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	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	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	0.4536	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4618	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	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

TABLE IX Percentage Points of the *F*-distribution, $\alpha = .$



F

Denominator Degrees of Freedom (ν_2) \ NUMERATOR DE (ν_1)	1	2	3	4
1	161.4	199.5	215.7	224.6
2	18.51	19.00	19.16	19.25
3	10.13	9.55	9.28	9.12
4	7.71	6.94	6.59	6.39
5	6.61	5.79	5.41	5.19
6	5.99	5.14	4.76	4.53
7	5.59	4.74	4.35	4.12
8	5.32	4.46	4.07	3.84
9	5.12	4.26	3.86	3.63
10	4.96	4.10	3.71	3.48
11	4.84	3.98	3.59	3.36
12	4.75	3.89	3.49	3.26
13	4.67	3.81	3.41	3.18
14	4.60	3.74	3.34	3.11
15	4.54	3.68	3.29	3.06
16	4.49	3.63	3.24	3.01
17	4.45	3.59	3.20	2.96
18	4.41	3.55	3.16	2.93
19	4.38	3.52	3.13	2.90
20	4.35	3.49	3.10	2.87
21	4.32	3.47	3.07	2.84
22	4.30	3.44	3.05	2.82
23	4.28	3.42	3.03	2.80
24	4.26	3.40	3.01	2.78
25	4.24	3.39	2.99	2.76
26	4.23	3.37	2.98	2.74
27	4.21	3.35	2.96	2.73
28	4.20	3.34	2.95	2.71
29	4.18	3.33	2.93	2.70
30	4.17	3.32	2.92	2.69
40	4.08	3.23	2.84	2.61
60	4.00	3.15	2.76	2.53
120	3.92	3.07	2.68	2.45
∞	3.84	3.00	2.60	2.37