單選題 (第 39 題 5 分，其餘每題 2.5 分)

1. A subset of a population selected to help make inferences on a population is called
   (a) a population
   (b) inferential statistics
   (c) a census
   (d) a sampie
2. when straight-line segments are connected through the midpoints at the top of rectangles of a histogram with the two ends "tied down" to the horizontal axis, the resulting graph is called
   (a) a bar chart
   (b) a pie chart
   (c) a frequency polygon
   (d) a frequency distribution
3. If the first five classes of a frequency distribution have a cumulative frequency of 50 from a sample of 58, the sixth and last class must have a frequency count of
   (a) 58
   (b) 50
   (c) 7
   (d) 8
4. Which of the following is true for a positively skewed distribution?
   (a) Mode = median = mean
   (b) mean < median < Mode
   (c) Mode < median < mean
   (d) median < Mode < mean
5. Which of the following is not affected by an extreme value in a data set?
   (a) The mean absolute deviation
   (b) The median
   (c) The range
   (d) The standard deviation
6. Given the following sample values, what is the sample variance?
   15, 20, 40, 25, 35
   (a) 9.27
   (b) 56.0
   (c) 10.37
   (d) 107.5

(背面仍有題目,請繼續作答)

7. An instructor recorded the following quiz scores (out of a possible 10 points) for the 12 students present. The scores were
   7, 4, 4, 7, 2, 9, 10, 6, 7, 3, 8, 5
   The interquartile range for this set of scores is
   (a) 7.5
   (b) 6.5
   (c) 8
   (d) 3.5
8. A final statistics exam had a mean of 70 and a variance of 25. If a student mad an 80 on his exam, what is his z score?
   (a) -2
   (b) 10
   (c) 0.4
   (d) 2
9. Given that a sample is approximately bell-shaped with a mean of 60 and a standard deviation of 3, the approximate value for the 98^{th} percentile for this distribution is
   (a) 63
   (b) 66
   (c) 69
   (d) 57
10. The number of students entering a university cafeteria during a random selected hour was observed. Following are the numbers for 20 different randomly selected hours during a week of final examinations when the cafeteria was open for business
    141, 100, 94, 88, 79, 74, 72, 71, 55 , 54, 52, 41, 35, 34, 33, 31, 29, 28, 28, 23
    What is the value of the first quartile for this set of values?
    (a) 118.0
    (b) 31.50
    (c) 77.75
    (d) 46.25
11. In a simple linear regression model with x representing the independent variable and y representing the dependent variable, correlation analysis is used to
    (a) Find the least-squares regression line
    (b) Find the slope of the regression line
    (c) Measure the strength and direction of the linear relationship between x and y.
    (d) Draw a scatter plot.

12. In the simple linear regression model, if there is a very strong correlation between the independent and dependent variables, then the correlation coefficient should be
    (a) Close to -1
    (b) Close to +1
    (c) Close to either -1 or +1
    (d) Close to zero

Use the following information to solve problems 13 to 16:

You are given the following set of observations for the independent variable x and the dependent variable y:

X	-3	-1	1	3
y	8	4	5	-1

13. The correlation coefficient is
    (a) -1.0
    (b) -0.8971
    (c) +1
    (d) 0.8971
14. The least-squares estimate of slope of the regression line is
    (a) +4.0
    (b) -1.3
    (c) -0.9
    (d) -4.0
15. The coefficient of determination is
    (a) -1.0
    (b) -0.8048
    (c) +1
    (d) 0.8048
16. What does the coefficient determination mean?

17. In an experiment where the probability of a success is 0.4 and you are interested in the probability of two successes out of seven trials, the correct probability for this situation is
    (a) 0.0774
    (b) 0.1600
    (c) 0.2613
    (d) 0.0016

(背面仍有題目,請繼續作答)

18. Which of the following is not a property of a binomial experiment?
    (a) The number of trials is fixed
    (b) There are exactly two possible outcomes for each trial
    (c) The individual trials are dependent on each other
    (d) The probability of success is the same for each trial
19. If X is a normal random variable with a mean of 15 and a variance of 9, then P(X=18) is
    (a) 0.8413
    (b) 0.0000
    (c) 0.3413
    (d) 0.1587
20. As the sample size increases,
    (a) The population mean decreases
    (b) The population standard deviation decreases
    (c) The standard deviation for the distribution of the sample means increases
    (d) The standard deviation for the distribution of the sample means decreases
21. Samples of size 49 are drawn from a population with a mean of 36 and standard deviation of 15. Then $P(\bar{x}<33)$ is
    (a) 0.5808
    (b) 0.4192
    (c) 0.1608
    (d) 0.0808

Use the following information for Questions 24 to 26:

Two machines are used to fill 50-pound bags of dog food. Sample information for these two machines is given below:

	MACHINE 1	MACHINE 2
Sample size	81	64
Sample mean (pounds)	51	48
Sample varinnce	16	12

22. The point estimate for the difference between the two population means (μ_1-μ_2) is
    (a) 17
    (b) 3
    (c) 4
    (d) -4

23. The standard deviation for the distribution of differences of sample means ($\mu_1 - \mu_2$) is
    (a) 0.6205
    (b) 0.1931
    (c) 0.3850
    (d) 0.3217
24. Find $P(\bar{x}_1 - \bar{x}_2 \geq 2)$
    (a) 0.4463
    (b) 0.0537
    (c) 0.9463
    (d) 0.5537
25. The sampling distribution of the sample proportions can be approximated generally by a normal distribution when
    (a) np>5
    (b) n>=30
    (c) both np>5 and n(1-p)>5
    (d) all the above are true
26. A 90 percent confidence interval for a population mean indicates that
    (a) We are 90 percent confident that the interval will contain all possible sample means with the same sample size taken from the given population
    (b) We are 90 percent confident that the population mean will be the same as the sample mean used in constructing the interval
    (c) We are 90 percent confident that the population mean will be covered within the interval
    (d) None of the above is true
27. The heights (inches) of the students on a campus are assumed to have a normal distribution with a standard deviation of 4 inches. A random sample of 49 students was taken with a mean of 68 inches. The 95 percent confidence interval for the population mean μ is
    (a) 67.06 to 68.94 inches
    (b) 66.88 to 69.12 inches
    (c) 63.42 to 72.48 inches
    (d) 64.24 to 71.76 inches
28. A type I error is defined to be the probability of
    (a) Not rejecting a true null hypothesis
    (b) Not rejecting a false null hypothesis
    (c) Rejecting a false null hypothesis
    (d) Rejecting a true null hypothesis

(背面仍有題目,請繼續作答)

29. A type II error is defined to be the probability of
    (a) Not rejecting a true null hypothesis
    (b) Not rejecting a false null hypothesis
    (c) Rejecting a false null hypothesis
    (d) Rejecting a true null hypothesis
30. It was reported that a certain population had a mean of 27. To test this claim, you selected a random sample of size 100. The computed sample mean and sample standard deviation were 25 and 7, respectively. The p-value for the appropriate set of hypothesis is
    (a) 0.0021
    (b) 0.9979
    (c) 0.0042
    (d) -0.4979
31. Which of the following is true when applying one-way ANOVA technique?
    (a) It involves a one-tailed test
    (b) The degrees of freedom equal the number of levels
    (c) The between-samples sum of squares always will equal the within-samples sum of squares
    (d) The variance of the population are assumed to be different from each other

Use the following information to solve problems 32 to 38:

The summary for a one-way ANOVA is given below:

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	*F* RATIO
Between samples (factor)	800	3	266.6667	2
Within samples (combined samples)	1,600	12	133.3333	
Total	2,400	15		

32. How many levels are there for the factor?
    (a) 3
    (b) 4
    (c) 2
    (d) 15
33. How many values of the response variable are there for each level if it is assumed that each level of the factor has equal sample size?
    (a) 3
    (b) 5
    (c) 12
    (d) 4

34. A possible null hypothesis for this table is
    (a) H0: $\mu_1 \neq \mu_2 = \mu_3 = \mu_4$
    (b) H0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$
    (c) H0: $\mu_1 = \mu_2 = \mu_3$
    (d) H0: $\mu_1 \neq \mu_2 \neq \mu_3$
35. The test statistic value for this table is
    (a) 266.67
    (b) 133.33
    (c) 2
    (d) 3
36. The degree of freedom (numerator, denominator) for the distribution of the F-test statistic are
    (a) (3,12)
    (b) (3,15)
    (c) (12,15)
    (d) (4,12)
37. If you are to test at the 5 percent level of significance for equality of means, then the critical F value for the test is
    (a) 2
    (b) 3.47
    (c) 8.74
    (d) 5.95
38. If you are to test at the 5 percent level of significance for equality of means, your decision will be
    (a) Fail to reject the null hypothesis
    (b) Reject the alternative hypothesis
    (c) Fail to reject the alternative hypothesis
    (d) Reject the null hypothesis
39. Please explain the central limit theorem

系所組別： 環境醫學研究所丁組

考試科目： 應用生物統計概論

考試日期：0226，節次：3

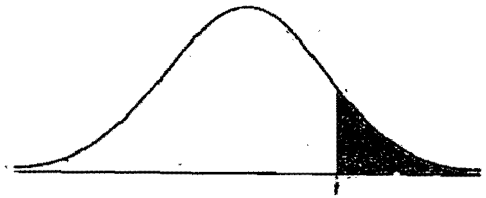
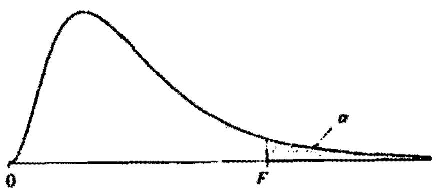


TABLE B: t-DISTRIBUTION CRITICAL VALUES

	Tail probability p											
df	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001	.0005
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	.765	.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	.741	.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	.727	.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	.718	.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	.700	.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	.695	.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	.694	.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	.692	.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	.691	.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	.690	.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	.689	.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	.688	.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	.688	.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	.687	.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	.686	.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	.686	.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	.685	.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	.685	.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	.684	.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	.684	.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	.684	.855	1.057	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3.421	3.690
28	.683	.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	.683	.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	.683	.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	.681	.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	.679	.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	.679	.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	.678	.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	.677	.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	.675	.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
∞	.674	.841	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.091	3.291
	50%	60%	70%	80%	90%	95%	96%	98%	99%	99.5%	99.8%	99.9%
	Confidence level C											

Areas in the upper tail of the standard normal distribution

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.500	0.496	0.492	0.488	0.484	0.480	0.476	0.472	0.468	0.464
0.1	0.460	0.456	0.452	0.448	0.444	0.440	0.436	0.433	0.429	0.425
0.2	0.421	0.417	0.413	0.409	0.405	0.401	0.397	0.394	0.390	0.386
0.3	0.382	0.378	0.374	0.371	0.367	0.363	0.359	0.356	0.352	0.348
0.4	0.345	0.341	0.337	0.334	0.330	0.326	0.323	0.319	0.316	0.312
0.5	0.309	0.305	0.302	0.298	0.295	0.291	0.288	0.284	0.281	0.278
0.6	0.274	0.271	0.268	0.264	0.261	0.258	0.255	0.251	0.248	0.245
0.7	0.242	0.239	0.236	0.233	0.230	0.227	0.224	0.221	0.218	0.215
0.8	0.212	0.209	0.206	0.203	0.200	0.198	0.195	0.192	0.189	0.187
0.9	0.184	0.181	0.179	0.176	0.174	0.171	0.169	0.166	0.164	0.161
1.0	0.159	0.156	0.154	0.152	0.149	0.147	0.145	0.142	0.140	0.138
1.1	0.136	0.133	0.131	0.129	0.127	0.125	0.123	0.121	0.119	0.117
1.2	0.115	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.100	0.099
1.3	0.097	0.095	0.093	0.092	0.090	0.089	0.087	0.085	0.084	0.082
1.4	0.081	0.079	0.078	0.076	0.075	0.074	0.072	0.071	0.069	0.068
1.5	0.067	0.066	0.064	0.063	0.062	0.061	0.059	0.058	0.057	0.056
1.6	0.055	0.054	0.053	0.052	0.051	0.049	0.048	0.047	0.046	0.046
1.7	0.045	0.044	0.043	0.042	0.041	0.040	0.039	0.038	0.038	0.037
1.8	0.036	0.035	0.034	0.034	0.033	0.032	0.031	0.031	0.030	0.029
1.9	0.029	0.028	0.027	0.027	0.026	0.026	0.025	0.024	0.024	0.023
2.0	0.023	0.022	0.022	0.021	0.021	0.020	0.020	0.019	0.019	0.018
2.1	0.018	0.017	0.017	0.017	0.016	0.016	0.015	0.015	0.015	0.014
2.2	0.014	0.014	0.013	0.013	0.013	0.012	0.012	0.012	0.011	0.011
2.3	0.011	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.008
2.4	0.008	0.008	0.008	0.008	0.007	0.007	0.007	0.007	0.007	0.006
2.5	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.005
2.6	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
2.7	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
2.8	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
2.9	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001
3.0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
3.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
3.2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
3.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



$\alpha = .05$

df_2 \ df_1	1	2	3	4	5	6	8	12	24	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	238.9	243.9	249.0	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.37	19.41	19.45	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.84	8.74	8.64	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.77	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.53	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.84	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.73	3.57	3.41	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.12	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.23	3.07	2.90	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.74	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.61	2.40
12	4.75	3.88	3.49	3.26	3.11	3.00	2.85	2.69	2.50	2.30
13	4.67	3.80	3.41	3.18	3.02	2.92	2.77	2.60	2.42	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.70	2.53	2.35	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.64	2.48	2.29	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.59	2.42	2.24	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.55	2.38	2.19	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.51	2.34	2.15	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.48	2.31	2.11	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.45	2.28	2.08	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.42	2.25	2.05	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.40	2.23	2.03	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.38	2.20	2.00	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.36	2.18	1.98	1.73
25	4.24	3.38	2.99	2.76	2.60	2.49	2.34	2.16	1.96	1.71
26	4.22	3.37	2.98	2.74	2.59	2.47	2.32	2.15	1.95	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.30	2.13	1.93	1.67
28	4.20	3.34	2.95	2.71	2.56	2.44	2.29	2.12	1.91	1.65
29	4.18	3.33	2.93	2.70	2.54	2.43	2.28	2.10	1.90	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.27	2.09	1.89	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.18	2.00	1.79	1.51
60	4.00	3.15	2.76	2.52	2.37	2.25	2.10	1.92	1.70	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.02	1.83	1.61	1.25
∞	3.84	2.99	2.60	2.37	2.21	2.09	1.94	1.75	1.52	1.00

Source: From Table V of R. A. Fisher and F. Yates, ***Statistical Tables for Biological, Agricultural and Medical Research***, published by Longman Group Ltd., London, 1974. (Previously published by Oliver & Boyd, Edinburgh.) Reprinted by permission of the authors and publishers.