考 試 科 目	統計學 41712	所 別	財務管理學系	考 試 時 間	2 月 28 日(六) 第三節

Multiple Choice Questions (2 pts each, 40 pts in total)

1. What is the lowest level of measurement to which a median can be computed?
   A. Nominal
   B. Ordinal
   C. Interval
   D. Ratio

2. A survey item asked students to indicate their class in college: freshman, sophomore, junior, or senior. Which measure(s) of central location would be appropriate for the data generated by that questionnaire item?
   A. Mean and median.
   B. Mean and mode.
   C. Mode and median.
   D. Mode only.

3. The test scores for a class of 151 students are computed. What is the location of the test score associated with the third quartile?
   A. 113
   B. 114
   C. 74
   D. 75%

4. In a statistics class, the final grade is computed based on three tests. Historically, the instructor tells the class that the probability of scoring "A"'s on the first two tests is 0.4. A student assigns a probability of 0.4 that he will not get an "A" on the first test. What is the probability that the student will score an "A" on the second test given that he scored an "A" on the first test?
   A. 0.60
   B. 0.66
   C. 0.85
   D. 1.00

5. When an experiment is conducted "without replacement," which one of the following is true?
   A. Events are equally likely.
   B. Events are dependent.
   C. The experiment can be illustrated using a Venn diagram.
   D. The probability of two or more events is computed as a joint probability.

6. The College basketball association is considering a Big Ten Basketball Conference. The top 10 basketball teams in the country would be members of the Big Ten Conference. Each team would play every other team in the conference during the season and the team winning the most games would be declared the national champion. How many games would the conference commissioner have to schedule each year?
   A. 45
   B. 90
   C. 125
   D. 5

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7. You are asked to design color codes for different cloths. Four colors are used to code on each cloth. Once a combination of four colors is used – such as red, yellow, green, and blue – these four colors cannot be rearranged to use as a code for another cloth. If there are 60 different cloths, how many different colors are needed?
   A. 5
   B. 6
   C. 7
   D. 8

8. A total of 80% of the customers of a fast food chain order a set menu (hamburger, French fries, and a drink.) If a random sample of 10 cash register receipts is selected, what is the probability that 8 or more will show that a set menu was ordered?
   A. 0.382
   B. 0.677
   C. 0.878
   D. 0.930

9. North Face Insurance writes weekend trip insurance at a very nominal charge. Records show that the probability that a motorist will have an accident during the weekend and file a claim is 0.001. Suppose they wrote 200 policies for the coming weekend, what is the probability that exactly one claim will be filed?
   A. 0.0001
   B. 0.0164
   C. 0.1638
   D. 0.8187

10. A tennis match requires that a player win three of five sets to win the match. If player A wins the first two sets, what is the probability that player A wins the match, assuming that player A is twice likely to win each set than the other player?
   A. 2/3
   B. 8/9
   C. 26/27
   D. 80/81

11. What is an important similarity between the uniform and normal probability distributions?
    A. About 68% of all observations are within one standard deviation of the mean.
    B. The mean, median, and mode are all equal.
    C. The mean and median are equal.
    D. Larger mean indicates larger variance.

12. Which of the following is true in a normal distribution?
    A. The area under the curve is less than one.
    B. The mode and the third quartile are equal.
    C. The interquartile range is two.
    D. The mean divides the distribution into two equal areas.

13. All possible samples of size n are selected from a population and the mean of each sample is determined. What is the mean of the sample means?
    A. The population mean.
    B. On average, it is larger than the population mean.
    C. On average, it is smaller than the population mean.
    D. It cannot be estimated in advance.

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14. Which one of the following is true on the size of the sampling error?
    A. It is directly related to the sample size, i.e., the larger the sample size, the larger the sampling error.
    B. It is directly related to the population mean, i.e., the larger the mean, the larger the sampling error.
    C. It is inversely related to the sample size, i.e., the larger the sample size, the smaller the sampling error.
    D. It is inversely related to the population standard deviation, i.e., the smaller the standard deviation, the larger the sampling error.

15. According to the Central Limit Theorem, which one of the following is true?
    A. The population mean and the mean of all sample means are equal.
    B. Increasing the sample size decreases the dispersion of the sampling distribution.
    C. The sampling distribution of the sample means is approximately normally distributed.
    D. All of the above are true.

16. Manufacturers were subdivided into groups by volume of sales. Those with more than $100 million in sales were classified as large; those from $50 to $100 million as medium size; and those below $50 as small size. Samples were then selected from each of these groups. What is this type of sampling called?
    A. Simple random sampling
    B. Systematic random sampling
    C. Stratified random sampling
    D. Cluster sampling

17. To evaluate the assumption of linearity, a multiple regression analysis should include
    A. a calculation of variance inflation factors
    B. scatter diagram of the dependent variable plotted as a function of each independent variable
    C. an ANOVA table
    D. hypothesis tests of individual regression coefficients

18. In an ANOVA table, for a multiple regression analysis, the variation of the dependent variable explained by the variation of the independent variables is represented by
    A. the regression sum of squares
    B. the total sum of squares
    C. the residual mean square
    D. the p-value

19. When does multicollinearity occur in a multiple regression analysis?
    A. When the dependent variables are highly correlated.
    B. When the regression coefficients are correlated.
    C. When the regression coefficients are all positive.
    D. When the independent variables are highly correlated.

20. Which one of the following can be used to test the hypothesis that two nominal variables are related?
    A. A goodness-of-fit test
    B. A contingency table analysis.
    C. ANOVA
    D. A regression analysis.

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General Questions (60 pts in total)

1. The British Bankers' Association wanted to look at the relationship between the amount of deposits made (in billions of £) and the number of customers that a bank had. Analysts collected data on six different large banks and found the following information. Assuming linear regression model is used.

Bank Name	Deposit (£ billion)	Customers (million)
Abbey National	101.7	13.6
Barclays	108.2	10.0
Lloyds	96.9	15.0
National Westminster	113.8	7.5
Woolrich	27.5	4.0
Halifax	77.1	7.6

   a. Write down the model. Which variable is the independent variable? Which is the dependent variable? (5 pts)
   b. Find the equation of the regression line for the data. (10 pts)
   c. At the 0.05 level, is the model significant? (10 pts)
   Note: You need to write down H_0, H_1, the test statistic, the critical value, the rejection region and the conclusion to receive full credit for this question.

2. How does time spent using the computer impact the speed with which you work? A software company ran a study that looked at the effectiveness with which a person uses a mouse. It selected 10 people with the same computer skills and measured the speed with which they moved a mouse at the beginning of a long session of computer use and after two hours of use. The data (in hundredths of a second) are shown below.

1	2	3	4	5	6	7	8	9	10
67	64	69	88	72	80	85	116	77	78
57	53	71	61	73	50	53	80	63	41

   Assuming that the data are normally distributed, set up the hypotheses to test at the 0.05 level of significance whether there was a change in the mean speed with which the people moved the mouse. (15 pts)
   Note: You need to write down H_0, H_1, the test statistic, the critical value, the rejection region and the conclusion to receive full credit for this question.

3. A random sample of individuals who drive alone to work in a large metropolitan area was obtained, and each individual was categorized with respect to both size of car and commuting distance. Does the accompanying data suggest that commuting distance and size of car are related in the population sampled? State the appropriate hypotheses and test at 0.05 level of significance. (20 pts)
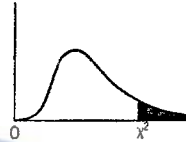   **Note: You need to write down H_0, H_1, the test statistic, the critical value, the rejection region and the conclusion to receive full credit for this question.**

		Commuting Distance		
		0 – 10 km	10 – 20 km	≥ 20 km
Size of Car	Subcompact	6	27	19
	Compact	8	36	17
	Midsize	21	45	33
	Full-size	14	18	6

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Table 5 Percentage Points of the t Distributions

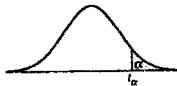| $t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$	df
3.078	6.314	12.706	31.821	63.657	1
1.886	2.920	4.303	6.965	9.925	2
1.638	2.353	3.182	4.541	5.841	3
1.533	2.132	2.776	3.747	4.604	4
1.476	2.015	2.571	3.365	4.032	5
1.440	1.943	2.447	3.143	3.707	6
1.415	1.895	2.365	2.998	3.499	7
1.397	1.860	2.306	2.896	3.355	8
1.383	1.833	2.262	2.821	3.250	9
1.372	1.812	2.228	2.764	3.169	10
1.363	1.796	2.201	2.718	3.106	11
1.356	1.782	2.179	2.681	3.055	12
1.350	1.771	2.160	2.650	3.012	13
1.345	1.761	2.145	2.624	2.977	14
1.341	1.753	2.131	2.602	2.947	15
1.337	1.746	2.120	2.583	2.921	16
1.333	1.740	2.110	2.567	2.898	17
1.330	1.734	2.101	2.552	2.878	18
1.328	1.729	2.093	2.539	2.861	19
1.325	1.725	2.086	2.528	2.845	20
1.323	1.721	2.080	2.518	2.831	21
1.321	1.717	2.074	2.508	2.819	22
1.319	1.714	2.069	2.500	2.807	23
1.318	1.711	2.064	2.492	2.797	24
1.316	1.708	2.060	2.485	2.787	25
1.315	1.706	2.056	2.479	2.779	26
1.314	1.703	2.052	2.473	2.771	27
1.313	1.701	2.048	2.467	2.763	28
1.311	1.699	2.045	2.462	2.756	29
1.282	1.645	1.960	2.326	2.576	inf.

Critical Values of Chi-Square

This table contains the values of χ^2 that correspond to a specific right-tail area and specific number of degrees of freedom.

Example: With 17 df and a .02 area in the upper tail, $\chi^2 = 30.995$

Degrees of Freedom, df	Right-Tail Area			
	0.10	0.05	0.02	0.01
1	2.706	3.841	5.412	6.635
2	4.605	5.991	7.824	9.210
3	6.251	7.815	9.837	11.345
4	7.779	9.488	11.668	13.277
5	9.236	11.070	13.388	15.086
6	10.645	12.592	15.033	16.812
7	12.017	14.067	16.622	18.475
8	13.362	15.507	18.168	20.090
9	14.684	16.919	19.679	21.666
10	15.987	18.307	21.161	23.209
11	17.275	19.675	22.618	24.725
12	18.549	21.026	24.054	26.217
13	19.812	22.362	25.472	27.688
14	21.064	23.685	26.873	29.141
15	22.307	24.996	28.259	30.578
16	23.542	26.296	29.633	32.000
17	24.769	27.587	30.995	33.409
18	25.989	28.869	32.346	34.805
19	27.204	30.144	33.687	36.191
20	28.412	31.410	35.020	37.566
21	29.615	32.671	36.343	38.932
22	30.813	33.924	37.659	40.289
23	32.007	35.172	38.968	41.638
24	33.196	36.415	40.270	42.980
25	34.382	37.652	41.566	44.314
26	35.563	38.885	42.856	45.642
27	36.741	40.113	44.140	46.963
28	37.916	41.337	45.419	48.278
29	39.087	42.557	46.693	49.588
30	40.256	43.773	47.962	50.892

備　　註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。