

國立臺北大學 108 學年度碩士班一般入學考試試題

系（所）組別：都市計劃研究所甲組

科目：統計學

第 1 頁 共 9 頁

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單選題(1~20 題，每題 2 分；21~40 題，每題 3 分)

1. What is the data type of the type of housing such as apartment, single house, townhouse and condo?
 - A. Interval
 - B. Nominal
 - C. Ordinal
 - D. Ratio
 - E. None of the above
2. What is the data type of the house value (unit: thousand dollars)?
 - A. Interval
 - B. Nominal
 - C. Ordinal
 - D. Ratio
 - E. None of the above
3. What is the data type of the number of apartments in a given area?
 - A. Interval
 - B. Nominal
 - C. Ordinal
 - D. Ratio
 - E. None of the above
4. Which is the most appropriate statistical chart for displaying the data for the type of housing such as apartment, single house, townhouse and condo?
 - A. Box plot
 - B. Dot plot
 - C. Histogram
 - D. Pie chart
 - E. Scatter plot
5. Which is the most appropriate statistical chart to display the data for the location (Urban and Rural) versus the type of housing (Apartment, Single house, Townhouse and Condo)?
 - A. Bar chart
 - B. Box plot
 - C. Histogram
 - D. Scatter plot
 - E. Stem and leaf plot
6. Which is the most appropriate statistical chart to display the data for the location (Urban and Rural) versus house value (unit: thousand dollars)?
 - A. Bar chart
 - B. Box plot
 - C. Histogram
 - D. Scatter plot
 - E. Stem and leaf plot

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接背面

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7. Which is the least appropriate statistical chart to display the data for house value (unit: thousand dollars)?
 - A. Bar chart
 - B. Box plot
 - C. Histogram
 - D. QQ plot
 - E. Stem and leaf plot
8. Which is the most appropriate statistical chart to display the data for house value (unit: thousand dollars) versus income (unit: thousand dollars)?
 - A. Bar chart
 - B. Box plot
 - C. Histogram
 - D. Scatter plot
 - E. Stem and leaf plot
9. Which is the most appropriate statistic to summary the data for the type of housing such as apartment, single house, townhouse and condo?
 - A. Interquartile
 - B. Mean
 - C. Median
 - D. Range
 - E. Relative frequency
10. Which is the most appropriate statistical statistic to summary the location of the data for house value (unit: thousand dollars)?
 - A. Correlation
 - B. Interquartile
 - C. Mean
 - D. Relative frequency
 - E. Skewness
11. Which is the lease appropriate statistic to summary the variability of the data for house value (unit: thousand dollars)?
 - A. Correlation
 - B. Interquartile
 - C. Standard deviation
 - D. Range
 - E. Variance
12. Which is the most appropriate statistic to summary the association between the data for house value (unit: thousand dollars) and income (unit: thousand dollars)?
 - A. Correlation
 - B. Interquartile
 - C. Mean
 - D. Relative frequency
 - E. Skewness

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13. In a particular city, 20% of the residents commute to work by cars, 30% of the residents commute to work by public transportations, 10% the residents uses both. Determine the probability of a resident from this city commute to work either by cars or public transportations.
- A. 0.1
B. 0.2
C. 0.3
D. 0.4
E. 0.7
14. Many organizations require their employees to be screened for drugs. Some employees are concerned that a “false positive” may be recorded from the screening; that is, employees who are not drug abusers may incorrectly test positive. Assume that 10% of a certain population are drug abusers. Suppose that the probability of a “false positive” is .5% and that the probability of a correct positive on someone who is under the influence of certain drugs is 99.9%. What is the probability that a person who tests positive is really a drug user?
- A. 0.0045
B. 0.0999
C. 0.1000
D. 0.9569
E. 0.9990
15. A corporation produces electrical components utilizing three nonoverlapping work shifts. It is known that 50% of the components are produced during shift 1, 20% during shift 2, and 30% during shift 3. A further look at product quality reveals that 6% of the components produced during shift 1 are defective. The corresponding percentage for shift 2 is 8%. Shift 3, the late-night shift, produces a relatively large percentage, 15%, of defective components. Given that a defective component is found, what is the probability that it was produced during shift 3?
- A. 0.150
B. 0.176
C. 0.290
D. 0.330
E. 0.495
16. An IRS auditor only has time to audit two of three tax returns. Suppose two of the tax returns show that the taxpayer owes the IRS. Assume that the IRS auditor is to randomly select two of the returns. Let R denote the event of refund and N denote the event of non-refund (owe). Define the random variable X to equal the number of tax returns among the two selected. What of the following statement is incorrect?
- A. The outcome of this experiment is RR, NR, NN.
B. The possible outcome of X is 0, 1, 2.
C. $P[RR]=4/9$
D. $P[NR]=2/9$
E. $P[NN]=1/9$

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17. Airline overbooking is a common practice. Many people make reservations on several flights due to uncertain plans and then cancel at the last minute or simply fail to show up. Eagle Air is a small commuter airline. Its planes hold only 15 people. Past records indicate that 20% of the people making a reservation do not show up for the flight. Let X denote the number of people making a reservation but do not show up for the flight out of 15 passengers. What of the following condition is not necessary for X to be a binomial random variable?
- A. A passenger is considered as a trial.
 - B. Each trial has only two outcomes such as “show up” and “don’t show up”.
 - C. Each trial has the same probability of passenger not showing up.
 - D. Trials are uncorrelated.
 - E. Trials are independent.
18. Airline overbooking is a common practice. Many people make reservations on several flights due to uncertain plans and then cancel at the last minute or simply fail to show up. Eagle Air is a small commuter airline. Its planes hold only 15 people. Past records indicate that 20% of the people making a reservation do not show up for the flight. Let X denote the number of people making a reservation but do not show up for the flight out of 15 passengers. Assume X is a binomial random variable. What of the following statement is incorrect?
- A. On a given flight, the probability that all passengers have seats is 0.2^{15} .
 - B. The mean number of people making a reservation but do not show up for the flight equals 3.
 - C. The mean number of people making a reservation and show up for the flight equals 12.
 - D. The standard deviation of X equals 1.549.
 - E. The variance of X equals 2.4.
19. What of the following statement is incorrect for a normal random variable X ?
- A. The area under a normal curve needs to be less than 1.
 - B. The mean and median of X are equal.
 - C. The mean and mode of X are equal.
 - D. The normal curve is symmetry about mean.
 - E. The probability above the mean and below the mean has to be equal.
20. Assume the secondary fee (X) for a case for a real estate agency in a real estate agency follows a normal distribution with mean 66.2 thousand dollars and standard deviation 4.4 thousand dollars. Which of the following statement is incorrect?
- A. The probability of this real estate agency will receive at least 70 thousand dollars equals 0.1949.
 - B. The probability of this real estate agency will receive exactly 74.82 thousand dollars equals 0.025.
 - C. The probability of this real estate agency will receive less than 62.4 thousand dollars equals 0.1949.
 - D. The probability of this real estate agency will receive less than 66.2 thousand dollars equals 0.5.
 - E. The probability of this real estate agency will receive more than 62.4 thousand dollars and less than 70 equals 0.6102.
21. What of the following condition is not necessary for the Central Limit Theorem?
- A. Each observation has equal mean.
 - B. Each observation has equal variance.
 - C. Each observation has to have a normal distribution.
 - D. Observations are independent.
 - E. The sample size has to be large.

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22. What of the following condition is not necessary for collecting the random samples?
- A. Each observation has equal mean.
 - B. Each observation has equal variance.
 - C. Each observation has the same distribution.
 - D. Observations are independent.
 - E. The sample size has to be large
23. What of the following properties is not true for the sample mean?
- A. It is often used to estimate the population mean.
 - B. The distribution of the sample mean is approximately normal when the sample size is large.
 - C. The mean of the sample mean equals the population mean.
 - D. The variance of the sample mean equals the population variance.
 - E. The observations used to compute the sample mean are independent.
24. What of the following properties is not true for the sample mean?
- A. It is often used to estimate the population mean.
 - B. The distribution of the sample mean is approximately normal when the sample size is large.
 - C. The mean of the sample mean equals the population mean.
 - D. The variance of the sample mean equals the population variance.
 - E. The observations used to compute the sample mean are independent.
25. The Tourism Bureau of Taiwan, would like to estimate the mean amount of money spent by a tourist to within \$1000 with 95% confidence. If the amount of money spent by tourists is considered to be normally distributed with a standard deviation of \$2000, what sample size would be necessary for the Chamber of Commerce to meet its objective in estimating this mean amount?
- A. 4
 - B. 6
 - C. 8
 - D. 11
 - E. 16
26. What of the following properties is not true for the t distribution?
- A. As the degrees of freedom increase, the t distribution is nearly identical to the standard normal distribution.
 - B. The mean of the t distribution equals 0.
 - C. The t distribution is bell shaped.
 - D. The t distribution is symmetric about 0.
 - E. The t distribution has thinner tails than the standard normal distribution.
27. What of the following properties is true for the confidence interval?
- A. As the confidence level gets larger, the length of confidence interval tends to be shorter.
 - B. As the mean gets larger, the length of confidence interval tends to be shorter.
 - C. As the sample size increases, the length of confidence interval tends to be shorter.
 - D. As the variance gets larger, the length of confidence interval tends to be shorter.
 - E. The confidence interval has the same length regardless of the random samples.

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28. Which is the most appropriate statistical test to evaluate the association between the data for the location (Urban and Rural) and house value (unit: thousand dollars)?
- A. Chi-square test
B. F test
C. McNemar test
D. Paired T test
E. Two-independent sample T test
29. What of the following condition is not required to construct a regression model?
- A. The mean value of each error term equals to 0.
B. The observations are independent.
C. The observations have the common variance.
D. The response variable has a common normal distribution.
E. The response variable has to be linear associated with the explanatory variable.
30. A real-estate agent would like to know whether renovation in an area would increase the house value. He randomly selects a sample of houses before renovation. He evaluates the house value before and after renovation. Which is the most appropriate statistical test to answer this question?
- A. Chi-square test
B. F test
C. McNemar test
D. Paired T test
E. Two-independent sample T test
31. Consider the problem of time use for housework for female and male. The time is reported by the average number of minutes per day spent on cooking and washing up. The following provides some summary statistics:

	N	Sample mean	Sample standard deviation
Women	733	37	16
Men	1219	23	32
95% CI for difference: (11.9, 16.1)			

Which of the following statement is the most appropriate statement?

- A. The average time use for women is significantly different than that for men.
B. The average time use for women is significantly higher than that for men.
C. The average time use for women is significantly lower than that for men.
D. The average time use for women is similar to that for men.
E. The information is not sufficient to make any inference.
32. Suppose a potential customer would like to evaluate where there exist difference in house value (unit: thousand dollars) between urban and Rural areas. Let μ_1 and μ_2 denote the average house value for urban and Rural areas. Also, let $\bar{x}_1$ and $\bar{x}_2$ denote the sample mean of house value for urban and Rural areas. Which of the following statement is correct?
- A. $H_0: \mu_1 \geq \mu_2$ versus $H_a: \mu_1 < \mu_2$.
B. $H_0: \mu_1 = \mu_2$ versus $H_a: \mu_1 \neq \mu_2$.
C. $H_0: \bar{x}_1 \geq \bar{x}_2$ versus $H_a: \bar{x}_1 < \bar{x}_2$.
D. $H_0: \bar{x}_1 = \bar{x}_2$ versus $H_a: \bar{x}_1 \neq \bar{x}_2$.
E. $H_0: \bar{x}_1 = \bar{x}_2$ versus $H_a: \bar{x}_1 < \bar{x}_2$.

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33. Which is the most appropriate test to evaluate the association for the data of the location (Urban and Rural) and the type of housing (Apartment, Single house, Townhouse and Condo)?
- A. Chi-square test
 - B. F test
 - C. McNemar test
 - D. Paired T test
 - E. Two-independent sample T test
34. Which is the correct statement of the null hypothesis to evaluate the association for the data of the location (Urban and Rural) and the type of housing (Apartment, Single house, Townhouse and Condo)?
- A. H_0 : Location and type of housing are associated.
 - B. H_0 : Location and type of housing are dependent.
 - C. H_0 : Location and type of housing are independent.
 - D. H_0 : Location and type of housing are uncorrelated.
 - E. None of the above.
35. When H_0 is true in a given test with significance level 0.05, what is the most range for the p-value?
- A. Equals to 0.05.
 - B. Greater than or equal to 0.95.
 - C. Greater than or equal to 0.05.
 - D. Less than 0.05.
 - E. Less than 0.95.
36. Which of the following statement is correct?
- A. A 95% confidence interval for μ = population mean IQ is (96, 110). So, in the test of $H_0: \mu = 100$ versus $H_a: \mu \neq 100$, the p-value is greater than 0.05.
 - B. For a fixed significance level α , the probability of a Type II error increases when the same size increases.
 - C. If we reject $H_0: \mu = 0$ in a study about change in weight on a new diet using a significance level of $\alpha = 0.05$, then we also reject it using $\alpha = 0.01$.
 - D. $P[\text{Type II error}] = 1 - P[\text{Type I error}]$
 - E. The p value is the probability that H_0 is true.
37. An industrial plant claims to discharge no more than 1000 gallons of wastewater per hour, on the average, into a neighboring lake. An environmental action group took some random samples from the lake over a period of time to analyze the true mean discharge of wastewater per hour exceeded the company claim of 1000 gallons. Consider a one-sided hypotheses and use a significance level of $\alpha = 0.05$. What of the following statement is correct?
- A. If the plant is not exceeding the limit, but actually $\mu = 1000$, there is only 5% chance that we will conclude they are exceeding the limit.
 - B. If the plant is exceeding the limit, there is only a 5% chance that we will conclude that they are not exceeding the limit.
 - C. If we reject H_0 , the probability that it is actually true is 0.05.
 - D. The probability that the sample mean equals exactly the observed value would equal 0.05 if H_0 were true.
 - E. All of the above.

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38. Suppose that a 99% confidence interval for the difference $p_1 - p_2$ between the proportions of men and women in Taiwan who are alcoholics equals (0.02, 0.09).
- A. We are 99% confident that the proportion of alcoholics is between 0.02 and 0.09.
 - B. We are 99% confident that the proportion of men in Taiwan who are alcoholics is between 0.02 and 0.09 larger than the proportion of women in Taiwan who are.
 - C. We can conclude that the population proportions may be equal.
 - D. We are 99% confident that a minority of Taiwan residents are alcoholics.
 - E. Since the confidence interval does not contain 0, it is impossible that $p_1 = p_2$.
39. Which of the following statement is when the one-way ANOVA provides relatively more evidence that $H_0: \mu_1 = \mu_2 = \dots = \mu_g$ is rejected?
- A. The smaller the between-groups variation.
 - B. The smaller the within-groups variation.
 - C. The larger the between-groups variation.
 - D. The larger the within-group variation.
 - E. None of the above.
40. Which of the following statement about coefficient of determination R^2 is incorrect?
- A. As the number of explanatory variables increases, R^2 may increase.
 - B. It provides the percentage of explained variance in the response variable using the regression model.
 - C. Its value must fall in 0 and 1.
 - D. The correlation of coefficient must equal to R^2 .
 - E. When $R^2 = 1$, the response variable has an exact linear relationship with the explanatory variable in the simple regression model.

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Table 1: Area under the standard normal curve

z	P[Z ≤ z]									
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.00	0.500	0.504	0.508	0.512	0.516	0.519	0.523	0.527	0.531	0.535
0.10	0.539	0.543	0.547	0.551	0.555	0.559	0.563	0.567	0.571	0.575
0.20	0.579	0.583	0.587	0.591	0.594	0.598	0.602	0.606	0.610	0.614
0.30	0.617	0.621	0.625	0.629	0.633	0.636	0.640	0.644	0.648	0.651
0.40	0.655	0.659	0.662	0.666	0.670	0.673	0.677	0.680	0.684	0.687
0.50	0.691	0.695	0.698	0.701	0.705	0.708	0.712	0.715	0.719	0.722
0.60	0.725	0.729	0.732	0.735	0.738	0.742	0.745	0.748	0.751	0.754
0.70	0.758	0.761	0.764	0.767	0.770	0.773	0.776	0.779	0.782	0.785
0.80	0.788	0.791	0.793	0.796	0.799	0.802	0.805	0.807	0.810	0.813
0.90	0.815	0.818	0.821	0.823	0.826	0.828	0.831	0.834	0.836	0.838
1.00	0.841	0.843	0.846	0.848	0.850	0.853	0.855	0.857	0.859	0.862
1.10	0.864	0.866	0.868	0.870	0.872	0.874	0.877	0.879	0.881	0.883
1.20	0.884	0.886	0.888	0.890	0.892	0.894	0.896	0.898	0.899	0.901
1.30	0.903	0.904	0.906	0.908	0.909	0.911	0.913	0.914	0.916	0.917
1.40	0.919	0.920	0.922	0.923	0.925	0.926	0.927	0.929	0.930	0.931
1.50	0.933	0.934	0.935	0.937	0.938	0.939	0.940	0.941	0.942	0.944
1.60	0.945	0.946	0.947	0.948	0.949	0.950	0.951	0.952	0.953	0.954
1.70	0.955	0.956	0.957	0.958	0.959	0.959	0.960	0.961	0.962	0.963
1.80	0.964	0.964	0.965	0.966	0.967	0.967	0.968	0.969	0.969	0.970
1.90	0.971	0.971	0.972	0.973	0.973	0.974	0.975	0.975	0.976	0.976
2.00	0.977	0.977	0.978	0.978	0.979	0.979	0.980	0.980	0.981	0.981
2.10	0.982	0.982	0.983	0.983	0.983	0.984	0.984	0.985	0.985	0.985
2.20	0.986	0.986	0.986	0.987	0.987	0.987	0.988	0.988	0.988	0.989
2.30	0.989	0.989	0.989	0.990	0.990	0.990	0.990	0.991	0.991	0.991
2.40	0.991	0.992	0.992	0.992	0.992	0.992	0.993	0.993	0.993	0.993
2.50	0.993	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.995	0.995
2.60	0.995	0.995	0.995	0.995	0.995	0.996	0.996	0.996	0.996	0.996
2.70	0.996	0.996	0.996	0.996	0.996	0.997	0.997	0.997	0.997	0.997
2.80	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.998	0.998
2.90	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
3.00	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.999	0.999