

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

計算題

一、(22%) Health insurance benefits vary by the size of the company. The sample data below show the number of companies providing health insurance for small, medium, and large companies. For purposes of this study, small companies are companies that have fewer than 100 employees. Medium-sized companies have 100 to 999 employees, and large companies have 1000 or more employees. The questionnaire sent to 225 employees asked whether or not the employee had health insurance and then asked the employee to indicate the size of the company. [Hint: You need to clearly show the hypothesis first. You may also refer to Appendix for proper distribution tables.]

Health Insurance	Size of the Company		
	Small	Medium	Large
Yes	36	65	88
No	14	10	12

- i) Conduct a test of independence to determine whether health insurance coverage is independent of the size of the company. What is the p -value? Using a .05 level of significance, what is your conclusion?
- ii) A newspaper article indicated employees of small companies are more likely to lack health insurance coverage. Use percentages based on the above data to support this conclusion.

二、(30%) An automobile dealer conducted a test to determine if the time in minutes needed to complete a minor engine tune-up depends on whether a computerized engine analyzer or an electronic analyzer is used. Because tune-up time varies among compact, intermediate, and full-sized cars, the three types of cars were used as blocks in the experiment. The data obtained are as follows. Use $\alpha = .05$ to test for any significant differences. [Hint: You need to clearly show the hypothesis first. You may also refer to Appendix for proper distribution tables.]

Car Type	Analyzer	
	Computerized	Electronic
Compact	50	42
Intermediate	55	44
Full-sized	63	46

三、(48%) **單選題：每題 4 分，答錯倒扣 2 分**

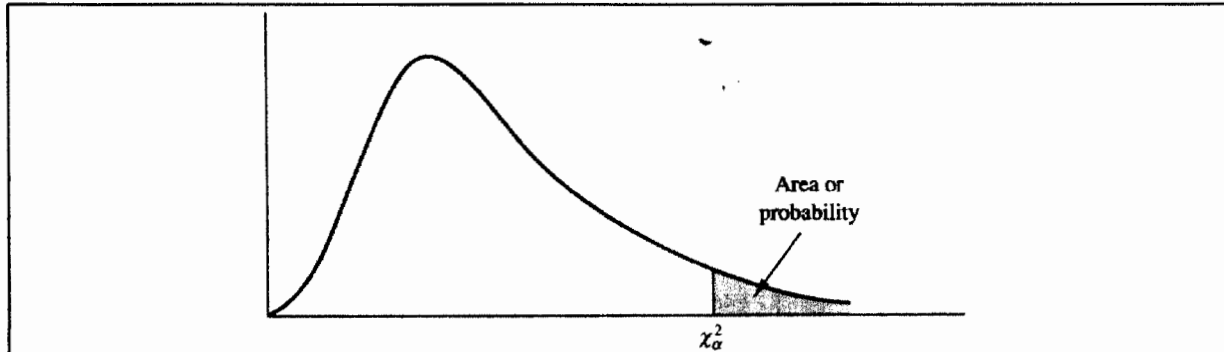
1. A sample of 41 observations yielded a sample standard deviation of 5. If we want to test $H_0: \sigma^2 = 20$, the test statistic is:
 - A) 100
 - B) 10
 - C) 51.25
 - D) 50

2. To compute an interval estimate for the difference between the means of two populations, the t distribution
 - A) is restricted to small sample situations
 - B) is not restricted to small sample situations
 - C) can be applied when the populations have equal means
 - D) None of these alternatives is correct.
3. What type of error occurs if you fail to reject H_0 when, in fact, it is not true?
 - A) Type I
 - B) Type II
 - C) either Type I or Type II, depending on the level of significance
 - D) either Type I or Type II, depending on whether the test is one tail or two tail
4. For a lower tail test, the p -value is the probability of obtaining a value for the test statistic
 - A) at least as small as that provided by the sample
 - B) at least as large as that provided by the sample
 - C) at least as small as that provided by the population
 - D) at least as large as that provided by the population.
5. The level of significance (α) is the
 - A) maximum allowable probability of Type I error
 - B) maximum allowable probability of Type II error
 - C) same as the confidence coefficient
 - D) same as the p -value
6. Which of the following does not need to be known in order to compute the p -value?
 - A) knowledge of whether the test is one-tailed or two-tailed
 - B) the value of the test statistic
 - C) the level of significance
 - D) None of these alternatives is correct.
7. If a hypothesis is rejected at the 5% level of significance, it
 - A) will always be rejected at the 1% level
 - B) will always be accepted at the 1% level
 - C) will never be tested at the 1% level
 - D) may be rejected or not rejected at the 1% level
8. If the level of significance of a hypothesis test is raised from .01 to .05, the probability of a Type II error
 - A) will also increase from .01 to .05
 - B) will not change
 - C) will decrease
 - D) will increase

9. As the number of degrees of freedom for a t -distribution increases, the difference between the t -distribution and the standard normal distribution
- A) becomes larger
 - B) becomes smaller
 - C) stays the same
 - D) None of these alternatives is correct.
10. In order to use the normal distribution for interval estimation of μ when σ is known and the sample is very small, the population
- A) must be very large
 - B) must have a normal distribution
 - C) can have any distribution
 - D) must have a mean of at least 1
11. In determining the sample size necessary to estimate a population proportion, which of the following information is not needed?
- A) the maximum margin of error that can be tolerated
 - B) the confidence level required
 - C) a preliminary estimate of the true population proportion p
 - D) the mean of the population
12. In a regression analysis, the error term ε is a random variable with a mean or expected value of
- A) zero
 - B) one
 - C) any positive value
 - D) any value

Appendix

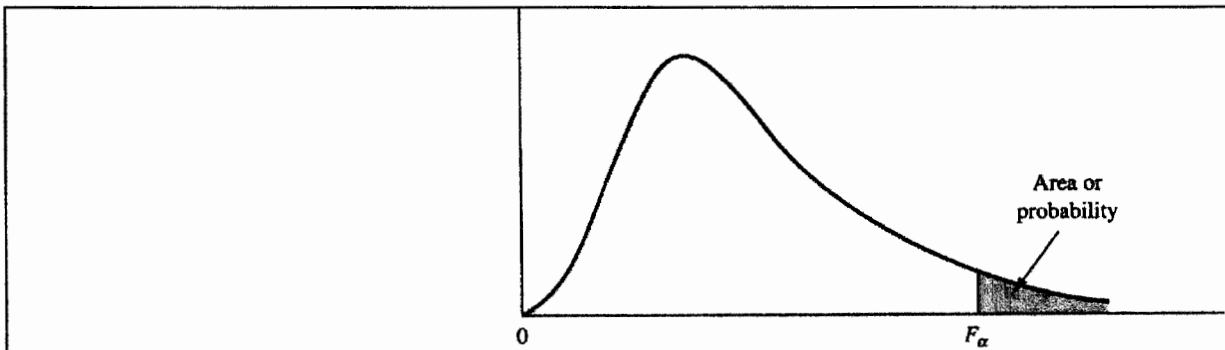
χ^2 table



Entries in the table give χ^2_{α} values, where α is the area or probability in the upper tail of the chi-square distribution. For example, with 10 degrees of freedom and a .01 area in the upper tail, $\chi^2_{.01} = 23.209$.

Degrees of Freedom	Area in Upper Tail									
	.995	.99	.975	.95	.90	.10	.05	.025	.01	.005
1	.000	.000	.001	.004	.016	2.706	3.841	5.024	6.635	7.879
2	.100	.020	.051	.103	.211	4.605	5.991	7.378	9.210	10.597
3	.072	.115	.216	.352	.584	6.251	7.815	9.348	11.345	12.838
4	.207	.297	.484	.711	1.064	7.779	9.488	11.143	13.277	14.860
5	.412	.554	.831	1.145	1.610	9.236	11.070	12.832	15.086	16.750

F Distribution table



Entries in the table give F_{α} values, where α is the area or probability in the upper tail of the F distribution. For example, with 8 numerator degrees of freedom, and a .05 area in the upper tail, $F_{.05} = 3.84$.

Denominator Degrees of Freedom	Area in Upper Tail	Numerator Degrees of Freedom											
		1	2	3	4	5	6	7	8	9	10	15	20
1	.10	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86	60.19	61.22	61.74
	.05	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	245.95	248.02
	.025	647.79	799.48	864.15	899.60	921.83	937.11	948.20	956.64	963.28	968.63	984.87	993.08
	.01	4052.18	4999.34	5403.53	5624.26	5763.96	5858.95	5928.33	5980.95	6022.40	6055.93	6156.97	6208.66
2	.10	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.42	9.44
	.05	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.43	19.45
	.025	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39	39.40	39.43	39.45
	.01	98.50	99.00	99.16	99.25	99.30	99.33	99.36	99.38	99.39	99.40	99.43	99.45