科目：統計學
考試時間：100 分鐘

系所：
經營管理研究所(甲組、乙組)　　是否使用計算機：是
本科原始成績：100 分

I.　MULTIPLE CHOICE QUESTIONS　　　　　　　　　　　　　　(50%)

1.　Which of the following sampling methods is a probabilistic sampling method?
   (a)　convenience sampling
   (b)　systematic sampling
   (c)　cluster sampling
   (d)　None of these alternatives is correct.

2.　The level of significance in hypothesis testing is the probability of
   (a)　rejecting a false null hypothesis
   (b)　rejecting a true null hypothesis
   (c)　accepting a true null hypothesis
   (d)　accepting a false null hypothesis

3.　The sampling distribution for a test of independence (contingency tables) is
   (a)　the t distribution
   (b)　the normal distribution
   (c)　the Poisson distribution
   (d)　the chi-square distribution

4.　Assume that event C and D are non-empty, and that both are mutually exclusive.　If event D is known to occur, the probability of the occurrence of event C is
   (a) one
   (b) any positive value
   (c) zero
   (d) any value between 0 to 1

5.　Random samples of size 16 are taken from an infinite population whose mean and standard deviation are 80 and 64, respectively.　The distribution of the population is unknown. The standard error of the sample mean is
   (a)　4
   (b)　5
   (c)　16
   (d)　20

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6. When sampling with replacement, the probability of obtaining a certain sample is best given by a
   (a) hypergeometric distribution
   (b) binomial distribution
   (c) Poisson distribution
   (d) normal distribution

7. The time series component which reflects a regular, multi-year pattern of being above and below the trend line is
   (a) irregular
   (b) seasonal
   (c) a trend
   (d) cyclical

8. Assume that event A is a subset of event B.　If event A is known to occur, the probability of the occurrence of event B is
   (a) one
   (b) zero
   (c) any positive value
   (d) any value between 0 to 1

9. A property of a point estimator that occurs whenever its expectation is equal to the population parameter is known as
   (a) efficiency
   (b) unbiased
   (c) consistency
   (d) sufficiency

10. The level of significance is the
    (a) same as the confidence coefficient
    (b) same as the p-value
    (c) maximum allowable probability of Type II error
    (d) maximum allowable probability of Type I error

II. In a random sample of NTU students 50% indicated they are law majors, 40% business majors, and 10% other majors.　Of the law majors, 60% were male; whereas, 30% of business majors were male.　Finally, 80% of the other majors were females.　Given that a person is females, what is the probability that she is a business major?　　　　　　　　　　(15%)

III. Let $Y_1, Y_2, \cdots, Y_n$ be a random sample from a distribution with p.d.f.　　　　(35%)

$$f(y; \theta) = (1/\theta)\exp(-y/\theta), \ 0 < y < \infty, \ 0 < \theta < \infty$$

(a)　Find the expected value and variance of *Y*.

(b)　Find the estimator $\tilde{\theta}$ for θ by the method of moment.

(c)　Find the maximum likelihood estimator $\hat{\theta}$ of θ.

(d)　Is $\hat{\theta}$ a consistent estimator of θ?　Explain.

(e)　Find the Cramer-Rao lower bound for the variances of unbiased estimators of θ.

(f)　Find a sufficient statistic of θ.