臺中健康暨管理學院

九十二學年度碩士班暨碩士在職專班招生考試試題紙

系　所　別	組　別	考試科目	考試日期	時　　間	備　註
資訊科技學系碩士班	--	機率與統計	92.3.30	13:30-15:10	共一頁

1. What is the Weak Law of Large Numbers? How to use it? (10%)

2. Let A and B be events in a sample space. Prove or disprove the following statements.

   (a) If P(A)=0, then A and B are independent. (5%)

   (b) If P(A)=1, then A and B are independent. (5%)

3. A random variable X has the probability density function $f(x) = 2a + b\,x^2$, $0 \le X \le 1$, with mean $\mu = 1$. (1) Find a and b. (2) Find also E(X) and Var(X). (10%)

4. What is the Central Limit Theorem? What are the assumptions for the Central Limit Theorem? (10%)

5. What is the Chebyshev's Inequality? How to use it? (10%)

6. Find the relationships among Hypergeometric distribution, Binomial distribution, And Poisson distribution. (10%)

7. Suppose that a random sample of size n=100 is sampled from a normal population with unknown mean μ and variance $\sigma^2 = 2500$. The goal is to test $H_0 : \mu = 60$ against $H_1 : \mu > 60$ at 2.5% significance level. If the sample mean $\bar{X} = 65$ is observed, what is the p-value and your conclusion? ($P\{Z > 2\} \approx 0.025$, $P\{Z > 1\} \approx 0.16$, where Z stands for the standard normal random variable.) (10%)

8. Let X have a uniform (0, 1). Find the probability density function (pdf) of Y= - log X and E(Y). (10%)

9. Given an example of a random variable whose expected value does not exist. (A formal proof is necessary) (10%)

10. (10%)

   (a) A test of independence is to be performed. The table has 5 rows and 4 columns. What is the degree of freedom?

   (b) Given a distribution which has the same mean and variance.

   (c) What's the meaning of "Coefficient of Correlation"?

   (d) In skewed-right distributions, what is the relationship of the mean, median, and mode?

   (e) When using the chi-square goodness-of-fit test, a statistician needs to make certain that none of the expected frequencies are less than _____.