國立台灣大學商學研究所博士班入學考試試卷(92學年度)

科目機率

第/頁/共2頁

Ph. D. Entrance Exam Operations and Logistics Management Probability

- 1. Let X_1 and X_2 have the joint p.d.f. $f(x_1, x_2) = \frac{x_1 + 2x_2}{18}$, $x_1 = 1, 2$, $x_2 = 1, 2$
 - (a) What the marginal probability density functions are respectively? (5%)
 - (b) Show that X_1 and X_2 independent or dependent. (5%)
 - (c) Calculate the covariance of X_1 and X_2 . (10%)
 - (d) Calculate the correlation coefficient.(10%)
- 2. Please specify the five-number summary of a set of data. (5%)
- 3. From an ordinary deck of playing cards, cards are to be drawn successively at random and without replacement. Please find out the probability that the third spade(♠) appears on the sixth draw. (5%)
- 4. The 30th anniversary of the Graduate Institute of Business Administration at NTU is scheduled to appear on March 8. The historical record shows that on March 8 it rained 1/4 of the time in the last 100 years. Dean Chang has the option to purchase a forecast from CTV Weather Service. CTV's accuracy varies. On those occasions when it has rained, he has been correct (i.e., he predicted wet) 90% of the time. On the other hand, when it has been sunny, he has been right (i.e., he predicted dry) only 80% of the time. If we receive the CTV's prediction, which is "dry", how your are going to revise the probabilities that we have a rainy day, and a sunny day on March 8. (10%)
- 5. Suppose that the proportion of defective items in a large lot is p, and suppose that a random sample of n items is selected from the lot. Let X denote the number of defective items in the sample, and let Y denote the number of nondefective items. Find E(X-Y) (10 points)
- 6. If X has a uniform distribution on the interval [a, b], what is the value of the fifth central moment of X? (10 points)
- 7. Suppose that a random variable X has a continuous distribution for which the p.d.f. f is as follows:

$$f(x) = \begin{cases} 2x & \text{for } x > 0 \\ 0 & \text{otherwise} \end{cases}$$

Determine the value of d that minimizes (a) $E[(X-d)^2]$ and (b) E(IX-dI). (10 points)

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科目機率

第2頁/共7頁

- 8. Suppose that the joint distribution of X and Y is a uniform distribution on the circle $x^2 + y^2 < 1$. Find the value of E(X/Y) (10 points)
- 9. Suppose that n students are selected at random without replacement from a class containing T students, of whom A are boys and T-A are girls. Let X denote the number of boys that are obtained. For what sample size n will Var(X) be a maximum? (10 points)