

國立交通大學 101 學年度碩士班考試入學試題

科目：機率論(4082)

考試日期：101年2月17日 第 2 節

系所班別：統計學研究所 組別：統計所

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【不可使用計算機】*作答前請先核對試題、答案卷(試卷)與准考證之所組別與考科是否相符!!

- (10 points) From an ordinary deck of 52 cards, cards are drawn successively without replacement. Let X and Y denote the number of spades in the first 10 cards and in the second 15 cards, respectively. Calculate the joint probability function of X and Y .
 - (10 points) Repeat (a) again when we draw the cards with replacement.
- (20 points) Let X and Y be independent random variables with expected values μ_1 and μ_2 , and variances σ_1^2 and σ_2^2 , respectively. Find $\text{Var}(XY)$ in terms of those expected values and variances.
- (20 points) The waiting period from the time a book is ordered until it is received is a random variable with mean seven days and standard deviation two days. If you want to be 95% sure that you receive a book by a certain date, how early should you order the book?
- (20 points) A fair coin is tossed successively. Find an approximate probability of obtaining at least 25 heads before 50 tails?
- (20 points) Using the properties of Poisson random variables and the central

limit theorem to find the limit $\lim_{n \rightarrow \infty} \frac{1}{3^{\frac{n}{3}}} \sum_{k=0}^{\lfloor \frac{n}{2} \rfloor} \frac{n^k}{k!}$.