

93 年度中央大學通訊工程學系碩士在職專班 【01】「機率」考題

考試日期：中華民國 93 年 3 月 13 日星期六，上午 08:30~10:10

考試地點：中央大學電機館一樓 E1-120 教室

考試時間：100 分鐘

試題總分：100 分

1. A box contains six identical balls numbered 1 through 6. Suppose two balls are drawn in succession. (a) What is the probability that the largest number drawn is less than or equal to 4? (b) What is the probability that 3 is the smallest number drawn? (20%)
2. A group of individuals containing twelve boys and eight girls is lined up in random order. That is, each of the  $20!$  permutations is assumed to be equally likely. What is the probability that the person in the sixth position is a boy? (10%)
3. Box 1 contains 1 white and 99 black balls. Box 2 contains 99 white and 1 black balls. A ball is picked from a randomly selected box. If the ball is black, what is the probability that it came from box 1? (15%)
4. Let  $p$  represent the probability of an event  $A$ . What is the probability that  $A$  occurs at least once in  $n$  independent trials? (10%)
5. Two fair dice are rolled. Let  $X$  equal the product of the 2 dice. Compute  $P\{X = i\}$  for  $i = 1, 2, \dots$ . (15%)
6. If  $X$  is uniformly distributed in the interval  $(0,1)$ , find the probability density function of  $Y = X^2$ . (15%)
7. If  $X$  and  $Y$  are independent random variables, both uniformly distributed in the interval  $(0,1)$ , calculate the probability density function of  $X + Y$ . (15%)