

國立臺北大學 104 學年度碩士班一般入學考試試題

系(所)組別：通訊工程學系

科目：機率

第 1 頁 共 1 頁

可 不可使用計算機

- Let X be the number of heads in two tosses of a fair coin.
 - Find the expected value $E[X]$. (10%)
 - Find the variance $\text{VAR}[X]$. (10%)
- Let X be the number of heads in N tosses of a fair coin. Find the probability mass function pmf. (10%)
- If you draw 5 cards from a set of 52 playing cards, what is the probability that you get 4 “Kings”? (Just write down the equations. Do not need to calculate a final number.) (10%)
- A fair coin is tossed 10 times. If the first 9 tosses are “heads”, is it more likely to get a “tail” in the 10th toss? (Answer yes or no.) (5%)
- Let $S = \{1, 2, 3, 4\}$ and $A = \{1, 2\}$, $B = \{1, 4\}$. Assume the outcomes are equally probable. Are A and B independent events? Why? (5%)
- X is a continuous uniform random variable with expected value $E[X] = 7$ and variance $\text{Var}[X] = 3$. What is $f_X(x)$, the probability density function of X ? (10%)
- Let X denote the duration in minutes of a telephone conversation. Assume that the density for X is given by
$$f_X(x) = (1/10)e^{-x/10}, \quad x > 0.$$
If you are waiting outside a telephone booth in the wind and rain, how long should you expect to wait, assuming you arrived one minute after the call started? (10%)
- Let X and Y be independent exponential random variables with common parameter λ . Define $Z = X + Y$. Find the probability density function $f_Z(z)$. (10%)
- X and Y are random variables with $E[X] = E[Y] = 0$ and $\text{Var}[X] = 1$, $\text{Var}[Y] = 4$ and correlation coefficient $\rho_{X,Y} = 1/2$. Find $\text{Var}[X + Y]$. (10%)

10. Suppose that X and Y are jointly continuous random variables with

$$f_{X,Y}(x,y) = \begin{cases} y-x, & 0 < x < 1, 1 < y < 2, \\ 0, & \text{otherwise.} \end{cases}$$

Find the covariance $\text{Cov}[X, Y]$. (10%)

試題隨卷繳交