

## 淡江大學 99 學年度碩士班招生考試試題

系別：數學學系

科目：機 率 論

准帶項目請打「V」	
	計 算 機

本試題共 1 頁，6 大題

- (10%) Let  $P(A) = 0.3$  and  $P(B) = 0.6$ .
  - Find  $P(A \cup B)$  when  $A$  and  $B$  are independent.
  - Find  $P(A' | B')$  when  $A$  and  $B$  are disjoint. ( $A'$  表示  $A$  之補集)
- (20%) Let  $X$  have the pdf  $f(x) = x^2/3$ ,  $-1 \leq x \leq 2$ .
  - Find the mean and median of  $X$ .
  - Set  $Y = X^2$ . Find the pdf of  $Y$ .
- (20%) Let  $X$  and  $Y$  be independent random variables with  $EX = 1$ ,  $EY = 2$ ,  $Var(X) = 3$ , and  $Var(Y) = 1$ . Find  $E(3X - Y + 4)$ ,  $Var(X - Y)$ ,  $Var(XY)$ , and  $\rho(X + Y, X - Y)$ . (Here  $\rho$  is the correlation coefficient).
- (20%) Let  $X$  have a binomial distribution  $Bin(n, p)$ . Find the moment-generating function of  $X$  to calculate its mean and variance.
- (20%) Let  $f(x, y) = 8xy$ ,  $0 \leq x \leq y \leq 1$ , be the joint *p.d.f.* of  $X$  and  $Y$ .
  - Compute  $P(0 < X < 1/2, 0 < Y < 1/2)$  and  $EXY$ .
  - Find the marginal *p.d.f.* of  $X$  and the conditional *p.d.f.* of  $Y$ , given  $X=x$ .
- (10%) Let  $X$  be a Poisson random variable with mean  $\mu = 25$ . Use normal approximation with continuity correction(連續性修正) to find  $P(2 \leq X < 7)$ . (以  $N(0,1)$  之 *c.d.f.*  $\Phi(x)$  表示答案)