

淡江大學九十一年度碩士班招生考試試題

系別：數學系

科目：機 率 論

25-1

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1. Consider k urns $U_j, j=1,2,\dots,k$ each of which contain m white balls and n black balls. A ball is drawn at random from urn U_1 and is placed in urn U_2 . Then a ball is drawn at random from urn U_2 and is placed in urn U_3 etc. Finally, a ball is chosen at random from urn U_{k-1} and is placed in urn U_k . A ball is then drawn at random from urn U_k . Compute the probability that this last ball is black. (20 分)

2. Let A, B and C are pairwise independent events, $P(A)=0.4$, $P(B)=0.6$, $P(C)=0.3$ and $P(B|A \cap C)=0.2$. Find $P(A \cap B^c \cap C)=?$ (20 分)

3. Let X_1, X_2 be two r.v.,s with moment generating function given by

$$M(t_1, t_2) = \left[\frac{1}{3}(e^{t_1+t_2} + 1) + \frac{1}{6}(e^{t_1} + e^{t_2}) \right]^2, t_1, t_2 \in R$$

(1). Calculate $E(X_1)$, $\text{Var}(X_1)$ and $\text{Cov}(X_1, X_2)$.

(2). Find the joint p.d.f. of (X_1, X_2) (20 分)

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35-2

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4. Let X and Y be r.v.'s whose joint p.d.f. f is given by $f(x,y) =$

$cxy I_{(0,2) \times (0,5)}(x,y)$. Determine the constant c and compute the

following probabilities:

- (1). $P(0.5 < X < 1, 0 < Y < 3)$;
 (2). $P(X < Y+3)$. (20 分)

5. If the pair of r.v.'s (X, Y) has the Bivariate Normal distribution with parameters $(\mu_1, \mu_2, \sigma_1, \sigma_2, \rho)$, and

$$U = \frac{X - \mu_1}{\sigma_1}, V = \frac{Y - \mu_2}{\sigma_2}, \text{ then :}$$

- (1) Determine the distribution of the r.v.'s $U+V, U-V$, and show that these r.v.'s are independent ;
 (2) Find the conditional p.d.f. of X given $Y=y$. (20 分)