

# 國立臺北大學 108 學年度日間學士班轉學生招生考試試題

學制系級：金融與合作經營學系日間學士班 2 年級

科 目：統計學

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可 不可使用計算機

一、(15%) If the moment-generating function of  $X$  is

$$M(t) = (2/5)e^t + (1/5)e^{2t} + (2/5)e^{3t},$$

find the mean, variance, probability density function of  $X$ .

二、(20%) Bowl  $B_1$  contains 2 white chips, bowl  $B_2$  contains 2 red chips,  $B_3$  contains 2 white and 2 red chips, and  $B_4$  contains 3 white chips and 1 red chip. The probability of selecting bowl  $B_1, B_2, B_3, B_4$  are  $1/2, 1/4, 1/8,$  and  $1/8,$  respectively. A bowl is selected using these probabilities, and a chip is then drawn at random. Find

(a)  $P(W)$ , the probability of drawing a white chip.

(b)  $P(B_1|W)$ , the conditional probability that bowl  $B_1$  had been selected, given that a white chip was drawn.

三、(20%) A bag contains 24 pieces of candy, of which 12 are peppermints and 12 are butterscotch. Let  $X$  equal the number of peppermints in a sample of five pieces of candy selected at random and without replacement from the bag. Find

(a)  $P(X=2)$

(b)  $P(X \leq 2)$

(c)  $\mu = E(X)$

(d)  $\sigma^2 = \text{Var}(X)$

四、(20%) Let  $X_1, X_2, \dots, X_n$  be a random sample from distributions with the following probability density functions:

$$f(x; \theta) = \frac{1}{2\theta^3} x^2 e^{-x/\theta}, \quad 0 < x < \infty, \quad 0 < \theta < \infty.$$

Please find the maximum likelihood estimator  $\hat{\theta}$ .

五、(25%) To test two method of instruction, 50 students are selected at random for each of two groups. At the end of the instruction period each student is assigned a grade (A, B, C, D, or F) by an evaluating team. The data are recorded as follows:

	Grade					Total
	A	B	C	D	F	
Group I	8	13	16	10	3	50
Group II	4	9	14	16	7	50

Please use a chi-square test with  $\alpha = 0.05$  to test the equality of the distributions of grade. The critical value of chi-square distribution for above test is as follows:

$r$	2	3	4	5	6
$\chi_{0.05}^2(r)$	5.991	7.815	9.488	11.070	12.590
$\chi_{0.025}^2(r)$	7.378	9.348	11.140	12.830	14.450

\*  $P(\geq \chi_{\alpha}^2(r)) = \alpha$  for  $X \sim \chi^2(r)$ .

試題隨卷繳交