

## 淡江大學九十二學年度轉學生招生考試試題

系別：統計學系三年級

科目：機率與微積分

准帶項目請打「○」否則打「×」	
×	簡單型計算機

本試題共 / 頁

1. For the r.v.  $X$  with p.d.f.  $f(x)=(1/2)^x, x=1,2,3,\dots$ (1) Calculate the  $E(X)$  (10%)(2) Calculate the probability  $P(X \leq 3)$ . (5%)2. The r.v.  $X$  has d.f.  $F$  given by:

$$F(x) = \begin{cases} 0, & x \leq 0 \\ 2c(x^2 - \frac{1}{3}x^3), & 0 < x \leq 2 \\ 1, & x > 2 \end{cases}$$

(1) Determine the constant  $c$ . (5%)

(2) Determine the corresponding p.d.f.. (5%)

(3) Calculate the probability  $P(X < 1)$ . (5%)3. The r.v.'s  $X, Y,$  and  $Z$  have joint p.d.f. given by:

$$f_{X,Y,Z}(x,y,z) = 8xyz, \quad 0 < x < 1, 0 < y < 1, 0 < z < 1.$$

(1) Derive the marginal p.d.f.'s  $f_X, f_Y,$  and  $f_Z$ . (10%)(2) Show that the r.v.'s  $X, Y,$  and  $Z$  are independent. (5%)4. Let the r.v.  $X$  be distributed as  $U(0,1)$  and set  $Y = -\log X$ .(1) Determine the p.d.f. of  $Y$ . (5%)(2) Calculate the probability  $P(Y > 10)$ . (5%)

5. Find the following limits. (15%)

$$(1) \lim_{x \rightarrow 2} \frac{x^2 + 5x + 6}{x^2 - 4} \quad (2) \lim_{x \rightarrow 0} (x \sin \frac{1}{x}) \quad (3) \lim_{x \rightarrow \infty} (1 + \frac{3}{x})^{2x}$$

6. Discuss the continuity of the function below at 3. (10%)

$$f(x) = \begin{cases} \frac{x^2 - 9}{x - 3}, & \text{if } x \neq 3 \\ 6, & \text{if } x = 3 \end{cases}$$

7. Use implicit differentiation to find  $dy/dx$  if:(1)  $3x + 4y - 5 = 0$  (5%)(2)  $3x^2 + 4y^2 - 2x = 0$  (5%)

8. Find the following integrals. (10%)

$$(1) \int_4^9 \frac{1}{\sqrt{x+x}} dx \quad (2) \int_0^1 \int_{-y}^y (x^2 + y^2) dx dy$$