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# 淡江大學 96 學年度碩士班招生考試試題

系別：資訊工程學系

科目：機 率 論

准帶項目請打「V」	
<input checked="" type="checkbox"/>	簡單型計算機
本試題共 / 頁	

1. Suppose that X is a discrete random variable with the probability function

$$p(x) = \begin{cases} k(|x-3|+1) & x = 0, \pm 1, \pm 2, \pm 3 \\ 0 & \text{otherwise} \end{cases} \quad (6+6+8 \text{ pts})$$

- (a) Show  $k = 1/28$ ;
- (b) Find  $P(X \text{ is odd} | X \leq 0.5)$ ;
- (c) Find  $\text{Var}(X)$ , the variance of X.

2. Suppose that X is a discrete random variable with  $E(X) = 1$  and  $E[X(X-2)] = 3$ . Let  $Y = -3X + 5$ .

(10+ 5 pts)

- (a) Find  $\text{Var}(Y)$ ;
- (b) Find the correlation coefficient of X and Y,  $\rho_{X,Y}$ .

3. Let X be an exponential random variable with mean 1. (10+15 pts)

- (a) Find the cumulative distribution function F(X) of X;
- (b) Find the probability density function of  $Y = -\ln X$ .

(hint: the probability density function of exponential random variable X with parameter  $\lambda > 0$  is  $f(x) = \lambda e^{-\lambda x}$   $x \geq 0$  and  $f(x) = 0$  otherwise.)

4. The joint Probability function of X & Y is given in the right, (6 + 8 + 10 pts)

- (a) Find  $P(XY=0)$ ;
- (b) Are X, Y independent?  
Give detailed work to support your answer.
- (c) Find the Probability function of W if  $W = \min(X, Y)$ ;

$P_{X,Y}(x,y)$	$y = -2$	$y = 0$	$y = 1$
$x = -1$	0	0.4	0.2
$x = 0$	0.1	0	0.1
$x = 1$	0.05	0.1	0.05

5. If X is a Gaussian RV with variance = 100, and  $P[X > 45.5] = 0.95$ , find (a)  $E[X]$ , (b)  $P[X \geq 68]$ . (16 pts)

The table in the following is  $\Phi(z) = P[Z \leq z]$  where Z is a standard normal random variable.

z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$
0.00	0.5000	0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.97725	2.50	0.99379		
0.01	0.5040	0.51	0.6950	1.01	0.8438	1.51	0.9345	2.01	0.97778	2.51	0.99396		
0.02	0.5080	0.52	0.6985	1.02	0.8461	1.52	0.9357	2.02	0.97831	2.52	0.99413		
0.03	0.5120	0.53	0.7019	1.03	0.8485	1.53	0.9370	2.03	0.97882	2.53	0.99430		
0.04	0.5160	0.54	0.7054	1.04	0.8508	1.54	0.9382	2.04	0.97932	2.54	0.99446		
0.05	0.5199	0.55	0.7088	1.05	0.8531	1.55	0.9394	2.05	0.97982	2.55	0.99461		
0.06	0.5239	0.56	0.7123	1.06	0.8554	1.56	0.9406	2.06	0.98030	2.56	0.99477		
0.07	0.5279	0.57	0.7157	1.07	0.8577	1.57	0.9418	2.07	0.98077	2.57	0.99492		
0.08	0.5319	0.58	0.7190	1.08	0.8599	1.58	0.9429	2.08	0.98124	2.58	0.99506		
0.09	0.5359	0.59	0.7224	1.09	0.8621	1.59	0.9441	2.09	0.98169	2.59	0.99520		
0.10	0.5398	0.60	0.7257	1.10	0.8643	1.60	0.9452	2.10	0.98214	2.60	0.99534		
0.11	0.5438	0.61	0.7291	1.11	0.8665	1.61	0.9463	2.11	0.98257	2.61	0.99547		
0.12	0.5478	0.62	0.7324	1.12	0.8686	1.62	0.9474	2.12	0.98300	2.62	0.99560		
0.13	0.5517	0.63	0.7357	1.13	0.8708	1.63	0.9484	2.13	0.98341	2.63	0.99573		
0.14	0.5557	0.64	0.7389	1.14	0.8729	1.64	0.9495	2.14	0.98382	2.64	0.99585		
0.15	0.5596	0.65	0.7422	1.15	0.8749	1.65	0.9505	2.15	0.98422	2.65	0.99598		
0.16	0.5636	0.66	0.7454	1.16	0.8770	1.66	0.9515	2.16	0.98461	2.66	0.99609		
0.17	0.5675	0.67	0.7486	1.17	0.8790	1.67	0.9525	2.17	0.98500	2.67	0.99621		
0.18	0.5714	0.68	0.7517	1.18	0.8810	1.68	0.9535	2.18	0.98537	2.68	0.99632		
0.19	0.5753	0.69	0.7549	1.19	0.8830	1.69	0.9545	2.19	0.98574	2.69	0.99643		
0.20	0.5793	0.70	0.7580	1.20	0.8849	1.70	0.9554	2.20	0.98610	2.70	0.99653		
0.21	0.5832	0.71	0.7611	1.21	0.8869	1.71	0.9564	2.21	0.98645	2.71	0.99664		
0.22	0.5871	0.72	0.7642	1.22	0.8888	1.72	0.9573	2.22	0.98679	2.72	0.99674		
0.23	0.5910	0.73	0.7673	1.23	0.8907	1.73	0.9582	2.23	0.98713	2.73	0.99683		
0.24	0.5948	0.74	0.7704	1.24	0.8925	1.74	0.9591	2.24	0.98745	2.74	0.99693		