

國立高雄第一科技大學 97 學年度 碩士班 招生考試 試題紙

系 所 別：風險管理與保險系

組 別：計量財務組

考科代碼：4231

考 科：統計學

注意事項：

- 1、本科目可使用本校提供之電子計算器。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

請依題號順序作答，否則不予計分

第一部份：共 7 題，每題 8 分。

1. An urn contains 1 white and 9 red marbles. A marble is drawn from the urn 100 times in succession with replacement. Find the probability of drawing more than 14 red marbles. Approximately, use the central limit theorem.
2. A sample of size 2 is drawn at random and without replacement from the population $\{1, 2, 3, 4, 5\}$. What is the probability that the range of the sample is equal to 2?
3. A bin of 6 light bulbs contains 2 that are defective. If 3 bulbs are chosen without replacement from the bin, what is the probability that exactly 1 of the bulbs in the sample are defective?
4. A card hand selected from a standard card deck consists of 2 kings, 2 queens, and a jack. Three additional cards are selected at random and without replacement from the remaining cards in the deck. What is the probability that the enlarged hand contains at least three kings?

5. Let X and Y be random variables with variances 2 and 3, respectively, and covariance -1 . Let $W = aX + (1 - a)Y$, where a is a constant. What is the value of a such that the random variable W has the smallest variance?
6. Suppose the straight line of the form $y = bx + 2$ is fitted to the five data points $(0, 3)$, $(1, 3)$, $(2, 1)$, $(3, 0)$ and $(4, 0)$ by the method of least squares. What is b ?
7. Let X be the number of independent Bernoulli trials performed until a success occurs. Let Y be the number of independent Bernoulli trials performed until 4 success occurs. A success occurs with probability p and $\text{Var}(X) = \frac{2}{3}$. Calculate $\text{Var}(Y)$.

第二部份：共 4 題，每題 11 分。

1. Let X be a discrete random variable with probability function $P(X = x) = \frac{3}{4^x}$ for $x = 1, 2, 3, \dots$. What is the probability that X is odd?
2. Let the random variable X have the density function $f(x) = kx^2$ for $0 \leq x \leq \sqrt{\frac{2}{k}}$, and zero elsewhere. What is the median of the distribution?
3. Let X be a single observation from continuous distribution with joint density function

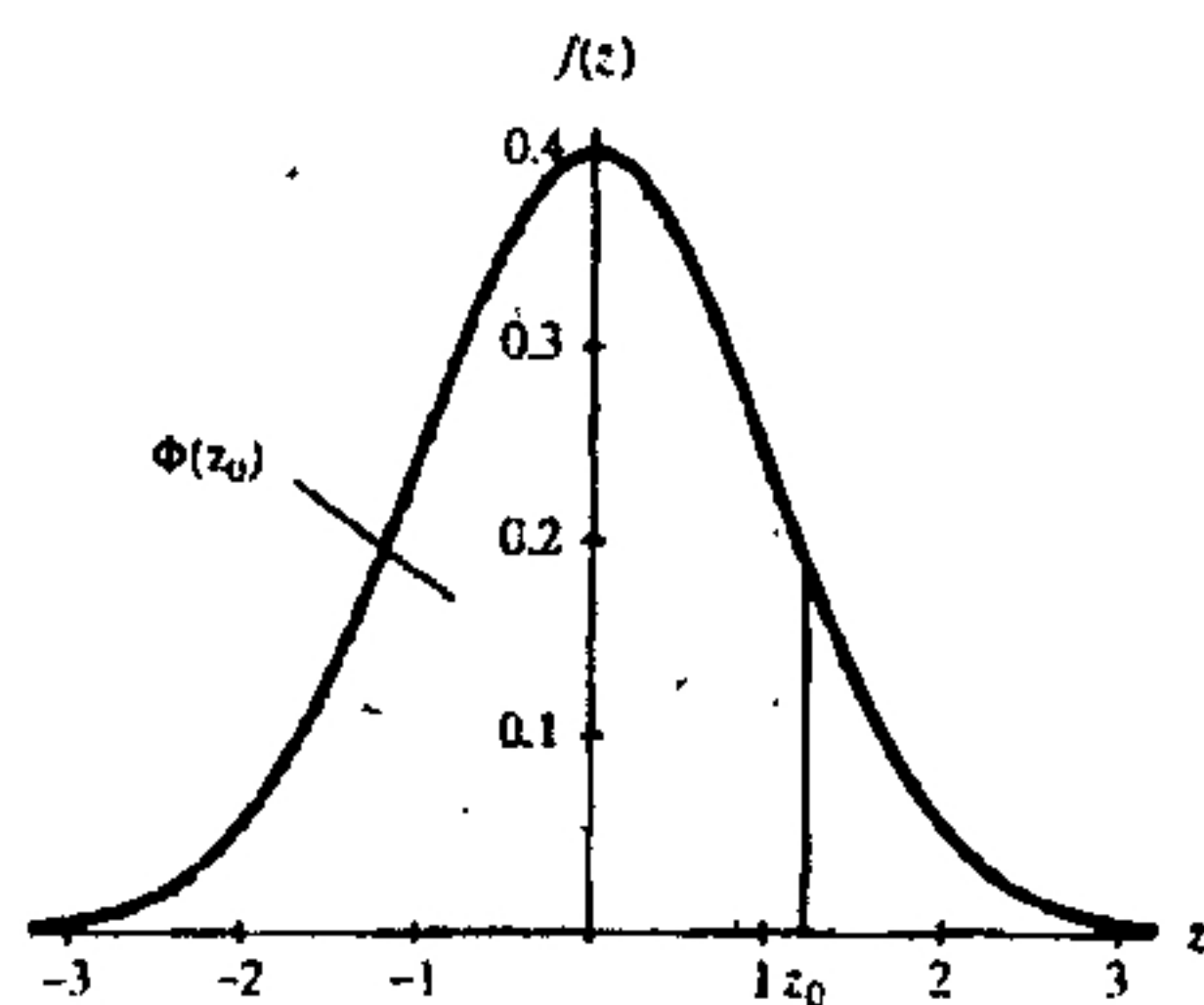
$$f(x; \theta) = \begin{cases} \frac{10}{3\theta} - \frac{x^2}{\theta^3} & \text{for } \theta \leq x \leq 3\theta, \\ 0 & \text{otherwise} \end{cases},$$

where $\theta > 0$. What is the maximum likelihood estimator of θ ?

4. Let X be a continuous random variable with density function

$$f(x) = \begin{cases} \frac{2}{3}x & \text{for } 1 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

If $Y = \sqrt{X}$, what is the density function of Y for $1 < y < \sqrt{2}$?



$$P(Z \leq z) = \Phi(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} e^{-w^2/2} dw$$

$$\Phi(-z) = 1 - \Phi(z)$$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7703	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
α	0.400	0.300	0.200	0.100	0.050	0.025	0.020	0.010	0.005	0.001
z_α	0.253	0.524	0.842	1.282	1.645	1.960	2.054	2.326	2.576	3.090
$z_{\alpha/2}$	0.842	1.036	1.282	1.645	1.960	2.240	2.326	2.576	2.807	3.291