

淡江大學 97 學年度碩士班招生考試試題

122-1

系別：統計學系

科目：統 計 學

准帶項目請打「V」	
✓	簡單型計算機

本試題共 2 頁，6 大題

1. 試解釋或定義下列名詞:(10 分)

- (1) Chebyshev's theorem
- (2) Bayes' theorem

2. To determine the possible effect of a chemical treatment on the rate of seed germination, 100 chemically treated seeds and 150 untreated seeds are sown. The numbers of seed that germinate are recorded in Table 1. Do the data provide strong evidence that the rate of germination is different for the treated and untreated seed? Answer by using (1) The χ^2 test at $\alpha = 0.05$. (2) The Z-test at $\alpha = 0.05$ and calculating the significance probability. (20 分)

Table 1

	Germinated	Not Germinated	Total
Treat	84	16	100
Untreated	132	18	150

3. If $P(A) = 0.5$, $P(B) = 0.3$ and $P(A \cup B) = 0.65$

- (1) Are A and B independent? Why or why not? (5 分)
- (2) Can A and B be mutually exclusive? Why or why not? (5 分)

4. Let random variable X have the following distribution. Derive the distribution of $Y = 2X + 1$.

- (1) Poisson with parameter θ . (4 分)
- (2) Normal with parameter μ and σ^2 . (6 分)

5. Let X be a continuous random variable that takes on values between 0 and c . That is, $P(0 \leq X \leq c) = 1$. Show that

- (1) $E(X^2) \leq cE(X)$. (5 分).
- (2) $Var(X) \leq \frac{c^2}{4}$. (8 分)

本試題雙面印製

◀ 注意背面尚有試題 ▶

淡江大學 97 學年度碩士班招生考試試題

122-2

122-2

系列：統計學系

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准帶項目請打「V」	
✓	簡單型計算機

本試題共 2 頁，6 大題

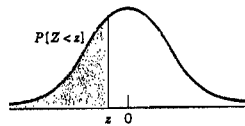
6. Let X_1, \dots, X_n be a random sample from geometric distribution with p.d.f.

$$f(x; \theta) = \begin{cases} \theta(1-\theta)^x, & \text{for } x = 0, 1, 2, \dots, \\ 0, & \text{otherwise,} \end{cases}$$

where $0 < \theta < 1$.

- (1) Show that $T = \sum_{i=1}^n X_i$ is a complete sufficient statistics for θ . (5 分)
- (2) Use the Method of Moments to find an estimator of θ . (5 分)
- (3) Find the maximum likelihood estimator of θ . (5 分)
- (4) Obtain the UMVUE of θ . (8 分)
- (5) Let θ have prior distribution $U(0, 1)$. Under squared loss, find the Bayes estimator of θ . (7 分)
- (7) Find the most powerful test for testing the hypothesis $H_0 : \theta = \theta_0$ against the alternative $H_1 : \theta \neq \theta_1$ at level of significance α , where $\theta_1 > \theta_0$. (7 分)

Standard Normal Probabilities



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-.7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
-.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641