

# 國立中央大學八十五學年度碩士班研究生入學試題卷

所別：資訊管理研究所 甲乙組

科目：統計學

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**壹. 選擇題，每題二分**

1. In order to test whether the variance of a population is equal to some value, we:
  1. use the F-distribution
  2. use the t-distribution
  3. use the chi-square distribution
  4. can only perform one-sided hypothesis tests on variances.
  
2. The power of a test is:
  1. the probability of not making a type II error
  2. the probability of not making a type I error
  3. the same as the level of significance
  4. the same as the p-value.
  
3. Chi-square tests may be used for testing hypotheses concerning:
  1. goodness of fit
  2. contingency
  3. proportions
  4. all of the above.
  
4. A random sample of 10 salesmen's sales, in cases, of a new product are: 15, 18, 7, 0, 6, 4,
 

an unbiased estimate of the population mean is:

  1. 9.0
  2. 6.0
  3. 7.27
  4. none of the above
  
5. an unbiased estimate of the population variance is: (已知  $\bar{x}$ )
  1. 52.89
  2. 47.60
  3. 10.0
  4. none of the above



**貳. 填充題：(每格3分)**

1. A sample of 25 items is to be selected at random from a large population. The probability is 0.05 that the sample that the sample variance will be less than the population variance by \_\_\_\_\_ percent.
  
2. A random sample of 300 nails is selected from a population of 1000, and 10 are found to be defective. If the true proportion of defectives is 2%, the probability of this sample result or one even more extreme is \_\_\_\_\_.
  
3. The 95 percent confidence interval for the population mean from a sample of 16 cans of peanuts with a mean of 505 grams and a standard deviation of 8 grams is \_\_\_\_\_.
  
4. The following table gives the pretest and posttest scores for five individuals in a training program. Then the 90 percent confidence interval for the difference is \_\_\_\_\_. If the null hypothesis that the difference in average scores is zero is test at  $\alpha = 0.01$  level, then the conclusion is to \_\_\_\_\_ the null hypothesis.

individual	pretest scores	posttest scores
1	74	82
2	72	78
3	79	79
4	75	81
5	75	80

**參. (十分)** 某工廠使用甲、乙、丙三部機器製造某種產品，已知甲機器生產全部產品的40%，乙機器生產全部產品的30%，丙機器生產全部產品的30%。依過去經驗得知，甲乙丙三部機器所生產的產品不良率分別為2%、4%與2%，試求：

- 一、由全部產品中任意抽出一個，其為不良品之機率？
- 二、已知其為不良品後，計算此產品來自甲機器之機率？

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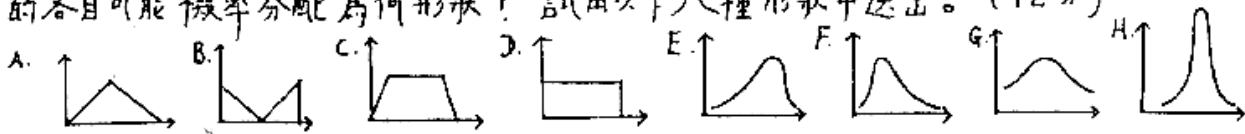
肆. (十分) 某公司考慮以兩種不同的廣告方式來促銷一種新產品。銷售經理相信甲廣告較乙廣告有效, 故將二種廣告分別在不同的市場進行測試; 其中一組80位看到甲廣告的消費者隨機樣本中, 有30人試用此產品。而另一組100位看到乙廣告的消費者隨機樣本中, 有24人試用此產品。若顯著水準為  $\alpha = .05$ , 試問此抽樣結果是否保證甲廣告比乙廣告有效? 並請求出p-值。

伍. 美國伊利諾大學的學者專家最近提出一篇研究報告指出, 根據他們的調查發現, 工作性質簡單的零售業者戴著耳機聽音樂工作可以提高工作效率達百分之十四。

(a) 請提出一個實驗設計或抽樣設計的調查計畫提案來驗證這個「帶耳機, 工作更有勁」的假設。(10分)

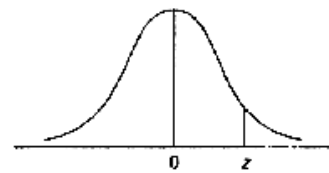
(b) 比較獨立樣本設計與成對樣本設計的利弊。(10分)

陸. 母體分配之機率函數為  $f(x) = 1/4$ ,  $x = 2, 4, 6, 8$ , 若  $n$  為抽樣之樣本數, 試問當 1.  $n=1$ , 2.  $n=2$ , 3.  $n=4$ , 4.  $n=30$  時, 樣本平均數,  $\bar{x}$ , 的各自可能機率分配為何形狀? 試由以下八種形狀中選出。(12分)



柒. 若  $\alpha$  為型 I 錯誤 (Type I Error),  $\beta$  為型 II 錯誤 (Type II Error), 試問  $\alpha = 0.05$  在何種狀況下  $\beta$  值為最大? (3分)  
最大之  $\beta$  值為多少? (2分)

附表: 常態分配表



捌. 若 Bernoulli 分配成功的機率為  $p$ , (a) 試問在以下之各分配時, 如何由 Bernoulli 分配的實驗中產生 (即其條件)? (b) 其數學式為何? (每小題3分, 計18分)

1. 二項分配
2. 幾何分配
3. 負二項分配

[註:

令  $X$  = 實驗成功的次數,

$Y$  = 實驗直至第一次成功的總次數

$Z$  = 實驗直至第  $x$  次成功的失敗總次數

$n$  = 實驗次數]

NORMAL CURVE AREAS

$z$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990