國立中央大學97學年度碩士班考試入學試題卷

所別：財務金融學系碩士班(甲、乙組)科目：統計　共 2 頁 第 1 頁

＊請在試卷答案卷（卡）內作答

1. (15%) The driver-training school gives a pretest to graduates before they take the official driving test. Sixty percent of the graduates pass a pretest, while the other 40 percent fail. Of the graduates who pass the pretest on the first attempt, 90 percent passes the official tests. Of the graduates who fail the pretest test on the first attempt, 30 percent passes the official test. Let A_1 denotes that a graduate passes the pretest on the first attempt, A_2 that the graduate fails, and B_1 that the graduate passed the official test.

   (1) (6%) Calculate the following probabilities: $P(B_1|A_2)$, $P(B_1)$, and $P(A_1|B_1)$

   (2) (5%) A graduate has passed the official test. Obtain the posterior probabilities that this graduate did not pass the pretest.

   (3) (4%) Is the pass of the official driving test independent of the pretest?

2. (15%) A Finance Professor of National Central University reported that the mean of book-to-market (BM) for firms listed in New York Stock Exchange (NYSE) is 0.82, while the mean of OTC stocks is 0.77. The sample consists of 300 NYSE stocks and 400 OTC stocks. Based on historical data, the population standard deviations for the BM can be assumed known at 0.30 for NYSE and 0.20 for OTC.

   (1) (6%) Do the sample data indicate that NYSE stocks have a higher BM than OTC stocks? Use α=0.05

   (2) (4%) What is the *p*-value?

   (3) (5%) What is the probability of committing a Type II error when the actual mean difference of BM between NYSE and OTC stocks is 0.0629?

3. (20%) Professor Lu in Institute of Finance, NCU, developed the following estimated regression equation relating final Financial Management score to the student's gender, college GPA, and the number of hours spent on study per week.

   $$\hat{y} = 25 + 5 \cdot X_1 + 10 \cdot X_2 + 8 \cdot X_3$$

   where

   y : final Financial Management score

   X_1 : a dummy variable set to 1 if female student and 0 otherwise..

   X_2 :college GPA

   X_3 :number of hours spent on study per week

   A portion of the SAS computer output follows.

Analysis of Variance

Source	DF	Sum of Squares	Mean square	F Value
Model	(A)	16000	(E)	(G)
Error	(B)	(C)	(F)	
Corrected Total	63	(D)		
S=	20		R-square=	(H)
Dependent Mean	55		Adj R-sq=	(I)

Parameter Estimates

Variable	Parameter Estimate	Standard Error	t-Value
Intercept	?	15	?
X_1	?	2.0	(J)
X_2	?	8.0	?
X_3	?	2.0	(K)

   (1) (7%) What are the vales of (A), (B), (C), (D), (E), (F), and (G)?

   (2) (8%) What are the vales of (H), (I), (J), and (K)?

   (3) (3%) Did the estimated regression equation provide a good fit to the data? Explain.

   (4) (2%) Is gender a significant factor in Financial Management score?

4. 設 N 表某段期間發生火警的次數，已知隨機變數 Λ 之機率密度函數 (p.d.f.) 爲 $u(\lambda)=\frac{1}{10}e^{-\frac{1}{10}\lambda}$，$\lambda>0$。若 N 之條件分配(Conditional Distribution)在給定 $\Lambda=\lambda$ 情況下屬於普瓦松分配(Poisson Distribution)具參數 λ，即 $N|\ \Lambda=\lambda \sim Poisson(\lambda)$，試求 $\Pr[N=n]$。(10 分)

5. 令 $X_1, X_2, \ldots, X_n$ 爲一組來自 Gamma(α,λ) 母體之隨機樣本，其分配函數爲 $f(x;\alpha,\lambda)=\begin{cases}\frac{\lambda^\alpha}{\Gamma(\alpha)}x^{\alpha-1}e^{-\lambda x} & ,若\ x>0\\ 0 & ,其他\ x\end{cases}$，其中 $\Gamma(\alpha)=\int_0^\infty u^{\alpha-1}e^{-u}du,\ \alpha>0$，試以動差法 (Method of Moment) 導出母體參數 α 與 λ 的點估計元(estimator)。 (10 分)

6. 設 X_1, X_2 表 p.d.f. 爲 $f(x)=\begin{cases}2x & ,0<x<1\\ 0 & ,\quad \text{o.w.}\end{cases}$ 的分配中之一組獨立隨機樣本，試計算條件機率 $\Pr(X_1<X_2\mid X_1<3X_2)$ 之值。(10 分)

7. 設隨機變數 X_1, X_2 爲獨立且服從二項分配，其參數分別爲 n_1, $p_1=0.5$，n_2, $p_2=0.5$，試求 $Y=X_1-X_2+n_2$ 之參數。(10 分)

8. 令 X 爲普瓦松分配(Poisson Distribution) $Poisson(\lambda)$ 的隨機變數，請定義並計算此分配之偏度 (Skewness) 與峰度 (Kurtosis)。(10 分) (提示: 用動差生成函數(Moment Generating Function))

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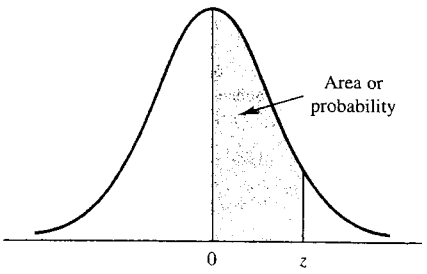

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean and z is .3944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.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

參考用