大同大學 九十一 學年度研究所招生入學考試試題

考試科目 ： 統計學　　所別 ： 事業經營研究所 第 1/1 頁

註 ： 本次考試**不可以**參考書籍及筆記；**不可以**使用字典；**可以**使用計算器

1. What are the sources of statistical data? How to examine your data prior to the application of statistical technique? (10 points)

2. In your words, briefly describe the difference between descriptive statistics and inferential statistics with examples. (10 points)

3. A random experiment consisting of flipping a coin twice, specify a sample space for it. How to define a random variable for it and what is the probability distribution for this random variable? (10 points)

4. Briefly describe the difference between p-value and α-value (nominal significance level) used in statistical test of hypothesis with examples? (10 points)

5. What is estimator? How to compare one statistical estimator with another? Please give examples to answer the questions. (10 points)

6. Airline passengers arrive randomly and independently at the passenger-screening facility at a major international airport.   The mean arrival rate is 10 passengers per minute. What is the probability of no arrivals in a 15-second period?   Please use the Poisson and exponential probability distributions respectively to answer this question. (15 points)

7. Please apply the central limit theorem to demonstrate how the sampling distribution of the sample proportion $\hat{p}$ can be approximated by a normal probability distribution provided that the sample size is greater than 30.   (10 points)

8. The following results are for two independent samples taken from the two populations with the same variances.   With $\alpha=0.05$, what is your hypothesis testing conclusions regarding H_0: $\mu_1-\mu_2=0$ vs. H_1: $\mu_1-\mu_2 \neq 0$ while using the t and F tests respectively given $t_{0.025,13} = 2.160$.

   Sample 1 $n_1=8$, $\bar{x}_1 = 1.4$, $s_1 = 0.4$

   Sample2 $n_2=7$, $\bar{x}_2 = 1.0$, $s_2 = 0.6$ (15 points)

9. In a regression analysis involving 30 observations, the following estimated regression equation was obtained.

$$\hat{y} = 17.6 + 3.8x_1 - 2.3x_2 + 7.6x_3 + 2.7x_4$$

For this estimated regression equation SSTO = 1805 and SSR = 1760. (Note: the total sum of squares is denoted SSTO whereas the sum of squares due to regression is denoted SSR.)   Suppose variable x_1 and x_4 are dropped from the model and the following estimated regression equation is obtained.

$$\hat{y} = 11.1 - 3.6x_2 + 8.1x_3$$

For this model SSTO = 1805 and SSR = 1705.   Use an F test and a 0.05 level of significance to determine whether x_1 and x_4 contribute significantly to the model, given the critical value $F_{0.05} = 3.39$.   (10 points)