國立中央大學八十八學年度碩士班研究生入學試題卷

所別： 產業經濟研究所 乙組 科目： 乙統計學 共 2 頁 第 1 頁

一.(36%) Let X equal the day of the year on which a person is born. Assuming each day of the year is equally likely and ignoring February 29. Suppose n students are randomly drawn from the National Central University. Record their days of born as $(X_1, X_2 \dots X_n)$.

(1) Find the probability density function (p.d.f) of $(X_1, X_2 \dots X_n)$.

(2) Define Y as the number of those students born on Sundays. Find the probability that $P(Y<2)$.

(3) Let Z equal the number of people that a researcher must ask, selecting randomly, in order to find someone with the same birthday as X_n. Define the p.d.f. of Z.

(4) Comment the following statement : "The sample mean $\overline{X}$ is distributed the same as X, but with less variation, i.e. σ^2 / n, where σ^2 is the variance of X.

二.(14%) A Taiwanese manufacturer for the computer industry has decided to locate a distribution facility in Europe if evidence shows that the market share of his product could reach 10%. How would you help the manufacturer to make the final decision. Make comments on the method you adapted.

三. (20%) Consider the production in the Taiwan for 1950-1988. We get the result:

$$\log X = -3.015 + 1.341 \log L + 0.292 \log K + 0.0052\, t$$
$$\qquad (0.091) \qquad (0.060) \qquad (0.0022)$$

R-square = 0.9954 adjusted R-square = 0.9949

residual sum of square (RSS) = 0.0434

cov(b1,b2) = -0.001552, b1=1.341 and b2=0.292

where X = gross domestic product, L = labor input, K = capital input and t = time trend. The estimated standard errors of parameter are in parenthesis.

(1) Please to test the hypothesis of constant return to scale.

(Note: at the 5% significance level, t value (d.f.=33) = 2.035, t value (d.f.=34) = 2.030, t value (d.f.=35) = 2.025)

Suppose we estimate the production function for the two periods 1950-1969:

$$\log X = -4.058 + 1.617 \log L + 0.220 \log K + 0.005\, t$$
$$\qquad (0.209) \qquad (0.230) \qquad (0.003)$$

R-square = 0.9759 RSS = 0.03555

1970-1988

$$\log X = -2.498 + 1.009 \log L + 0.579 \log K + 0.004\, t$$
$$\qquad (0.209) \qquad (0.230) \qquad (0.002)$$

R-square = 0.9958 RSS = 0.00336

(2) Please to test the hypothesis of structural stability.

(Note: at the 5% significance level, F(3,33)=2.90, F(4,31)=2.68, F(5,30)=2.53)

四.(20%) Consider the model:

$$Y_t = \alpha + \beta X_t + \mu_t$$
$$\mu_t = \rho \mu_{t-1} + \varepsilon_t \quad -1 < \rho < 1$$

(1) Please to describe the Durbin-Watson test procedures.

(2) If the model has the presence of autocorrelation, please to describe the estimation procedures by the Cochrane-Orcutt method.

五.(10%) Consider the geometric distribution:

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

where p denote the probability that an event A will occur. Please to find the maximum likelihood estimate of p.

參考用