考試科目 Course	數學	系組	經研所	日期 Date, Period	七月二日 第二節	試題編號 CourseNo.	119

國立政治大學圖書館

1. Let the national –income model be

$Y = C + I + G_0$ (C=Consumption, Y=Income, I=Investment,

$C = a + b(Y - T_0)$ G=Government Expenditure, T=Income Tax)

$I = c + dY$

(a) Identify the endogenous variables.

(b) Write the model in matrix notation and test whether the coefficient matrix is nonsingular.

(c) Solve the system by Gauss-Jodam reduction method. $(\bar{Y}, \bar{C}, \bar{T})$

(d) Find $\partial Y/\partial G_0$, $\partial Y/\partial T_0$. Interpret their meaning and determine their sign. (20%)

2. For the matrix

$$A = \begin{bmatrix} 0 & 2 & 2 \\ 2 & 0 & 2 \\ 2 & 2 & 0 \end{bmatrix}$$

(a) Write the characteristic equation and eigenvalues.

(b) Find the eigenvectors corresponding to the eigenvalues.

(c) Diagonalize A by an orthogonal matrix. (20%)

3. A consumer has utility function

$$u = x_1 x_2$$

And she faces the money-income constraint

$$2x_1 + 3x_2 \le 100$$

And the time constraint

$$x_1 + 4x_2 \le 80$$

Solve for her utility-maximizing consumption bundle and the values of the shadow prices of the constraints. (15%)

4. Given production function Q=Q(L,K)

(a) How would you express algebraically the Isoquant for the output of 260?

(b) Write out the slope of the Isoquant.

(c) Write out the profit function of the firm.

(d) Find the first and second order condition for the optimal combination of inputs.

(e) Find the comparative-static derivatives $\partial \bar{I}/\partial P$, $\partial \bar{L}/\partial P_L$, $\partial L/\partial P_K$

(L=lable, K=capital, P = price of the product, P_L = price of L, P_K = price of K) (20%)

5. Solve $(t + y^2)dy + (y - t^2)dt = 0$ (10%)

6. Evaluate

(a) $\int_0^3 \int_{\sqrt{x}}^3 e^{y^3} dy dx$ (b) $\int_0^1 x \ln x dx$ (15%)