

東吳大學 107 學年度暑假轉學生招生考試試題

第 1 頁，共 2 頁

系級	經濟學系三年級	考試時間	100 分鐘
科目	經濟數學	本科總分	100 分

※一律作答於答案卷上(題上作答不予計分)，並務必標明題號，依序作答。

1. (20 points) A *goods market* is described by the following set of equations:

$$Y = C(Y - T(Y)) + I(r) + G_0,$$

where Y is the level of national income, and C , I , G , and T are consumption, investment, government spending, and taxes, respectively. If we denote disposable income as $Y^d = Y - T$, then the consumption function can be expressed as: $C(Y^d)$, where $0 < C'(Y^d) < 1$ is the marginal propensity to consume.

Investment spending is assumed to be a strictly decreasing function of the rate of interest, r : $I'(r) < 0$. The public sector is described by two variables: government spending (G) and taxes (T). Typically, government spending is assumed to be exogenous whereas taxes are assumed to be an increasing function of income: $0 < T'(Y) < 1$.

A *money market* is described by the following three equations: $M^d = L(Y, r)$, $M^s = M_0^s$, and $M^d = M^s$, where $L_Y > 0$, $L_r < 0$ and the money supply is assumed to be exogenously determined by the central monetary authority.

- (a) Derive the slope of the IS curve.
- (b) Derive the slope of the LM curve.
- (c) Derive the following two comparative-static derivatives: dY^*/dG_0 and dr^*/dG_0 .

2. (20 points) Use Cramer's rule to solve the following equation systems:

$$4x + 3y - 2z = 1$$

- (a) $x + 2y = 6$
- $3x + z = 4$

$$-x + y + z = a$$

- (b) $x - y + z = b$
- $x + y - z = c$

3. (10 points) Compute the determinant of A , where $A = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}$. How many solutions does

the homogeneous equation $Ax = 0$ have?

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第 2 頁，共 2 頁

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4. (10 points) Let the equilibrium condition for national income be

$$S(Y) + T(Y) = I(Y) + G_0 \quad (S', T', I' > 0; S' + T' > I'),$$

where S, Y, T, I and G stand for saving, national income, taxes, investment, and government expenditure, respectively. All derivatives are continuous.

(a) Check whether the conditions of the implicit-function theorem are satisfied. If so, write the equilibrium identity.

(b) Find (dY^*/dG_0) and discuss its economic implications.

5. (10 points) Determine whether $q = 2u^2 + 3v^2 - w^2 + 6uv - 8uw - 2vw$ is either positive or negative definite.

6. (20 points) Use the Lagrange-multiplier method to find the stationary values of z and determine whether it is a maximum or a minimum:

(a) $z = xy$, subject to $x + 2y = 2$.

(b) $z = x(y + 4)$, subject to $x + y = 8$.

(c) $z = x - 3y - xy$, subject to $x + y = 6$.

(d) $z = 7 - y + x^2$, subject to $x + y = 0$.

7. (10 points) Are the following functions quasiconcave? Strictly so? First check graphically, and then algebraically. Assume that $x \geq 0$.

(a) $f(x) = a$

(b) $f(x) = a + bx$ ($b \geq 0$)