

淡江大學九十學年度碩士班招生考試試題

系別：產業經濟學系

科目：微 積 分

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本試題雙面印製

1. Given the function $y = f(x) = \frac{2x^2}{x^2 + 1}$. Please check if this function is continuous in real number $x \in (-\infty, \infty)$. (10%)

2. Given demand function $Q = \frac{a}{P^n}$, where a and n are positive constants. Please find the point elasticity of demand. (10%)

3. (1) Given the equation $F(x, y) = x^3 - 2x^2y + 3xy^2 - 22 = 0$, is an implicit function $y = f(x)$ defined around $(y=3, x=1)$? If yes, find $\frac{dy}{dx}$ and evaluate it at point $(y=3, x=1)$. (10%)

(2) Let the national-income model be

$$Y - C(Y) - I(i) - G_0 = 0 \quad (0 < C' < 1 ; I' < 0)$$

$$kY + L(i) - M_0^s = 0 \quad (k \text{ is a positive constant ; } L' < 0)$$

where Y is income, C is consumption, I is investment, G_0 is government expenditure, L is money demand and M_0^s is money supply. Please analyze the comparative statics of

the model when money supply changes, i.e. find out $\frac{dY^*}{dM_0^s}$ and analyze it. (15%)

4. Given $y = (x - 2)^6 + 5$. Find the stationary value and determine the exact nature of this stationary value (i.e. Is it relative maximum or relative minimum?) (10%)

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5. Define a differentiable function $f(x) = f(x_1, x_2, \dots, x_n)$ is concave (convex) iff, for any given point $u = (u_1, u_2, \dots, u_n)$ and any other point $v = (v_1, v_2, \dots, v_n)$ in the domain,

$$f(v) \leq (\geq) f(u) + \sum_{j=1}^n f_j(u)(v_j - u_j)$$

where $f_j(u) = \frac{\partial f}{\partial x_j}$ is evaluated at $u = (u_1, u_2, \dots, u_n)$. Please use above definition to check

if $z = -xy$ is concave, convex, strictly concave, strictly convex or neither. (10%)

6. Find (1) $\int x \ln x dx$ (10%)

(2) $\int_2^4 (e^{2x} + e^x) dx$ (10%)

7. Given $\frac{dy}{dt} + 10y = 15$; $y(0)=0$, find the general solution y_c and the particular solution y_p . (15%)