淡江大學九十一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

准帶項目請打「○」否則打「×」	
計算機	字典
X	X

1. Determine whether the following series converge or diverge:

(1) $\sum_{n=1}^{\infty}\frac{1}{(n+1)\ln(n+1)}$ (5%) (2) $\sum_{n=0}^{\infty}\frac{2^n}{n!}$ (5%) (3) $\sum_{n=1}^{\infty}\frac{4\sqrt{n}-1}{n^2+2\sqrt{n}}$ (5%)

2. Find (1) $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$, if $3x^2z-x^2y^2+2z^3+3yz-5=0$. (8%)

(2) $\frac{\partial w}{\partial s}$ and $\frac{\partial w}{\partial t}$, if $w=xy+yz+xz$, $x=s\cos t$, $y=s\sin t$, and $z=t$, when $s=1$ and $t=2\pi$. (8%)

3. Find a power series centered at $x=1$ for $f(x)=\ln x$. (8%)

4. Evaluate (1) $\int_0^{\sqrt{3}}x^3\sqrt{4-x^2}\,dx$ (8%)

(2) $\int_0^1\frac{3x+4}{x^3-2x-4}dx$ (8%)

5. Find the local extrema of $f(x,y)=x^3-4xy+2y^2$, if any exist. (10%)

6. For the CES (constant elasticity of substitution) production function

$Q=A[\delta K^{-\rho}+(1-\delta)L^{-\rho}]^{-1/\rho}$,

where K and L represent two factors of production, and A,δ,ρ are three parameters ($A>0$, $0<\delta<1$, $-1<\rho\neq 0$), demonstrate

(1) the CES production function is quasiconcave for positive K and L. (10%)

(2) the CES function approaches the Cobb-Douglas function ($AK^{\delta}L^{1-\delta}$) as $\rho\to 0$. (10%)

7. Investigate the scalar dynamical system

$x_{t+1}=f(x_t)$ where $x_t\geq 0$ for each t, and

$f(x)=(1/2)(1+x)$ if $0\leq x<2$

$=2+(1/2)x$ if $x>2$

Compute all steady states and examine their asymptotic stability. What is the asymptotic behavior of orbits starting in the interval (0, 2) and in the interval (2, ∞)? (15%)