中國文化大學 97 學年度轉學招生考試

系組：經濟學系、資訊管理學系二年級　　日期節次：7 月 30 日第 3 節 13:30-14:50

科目：微積分　(77-118)

4-5-1

■不可使用計算機

一、Find each limit of the following: (10%)

$(a)\lim_{x\to\infty}(\sqrt{x^2+x}-x)$　　$(b)\ \lim_{x\to 3}\dfrac{2x^2-7x-15}{x-5}$

二、Function f is defined as follows: (10%)

$$f(x)=\begin{cases}x^2 & if\ \ x\le 1\\ ax+b & if\ \ x>1\end{cases}$$

Find value of a and b, such that f at $x=1$ be differentiable.

三、Find $\dfrac{dy}{dx}$, if $y=\dfrac{(x^2+3)^{\frac{2}{3}}(3x+2)^2}{\sqrt{x+1}}$　(10%)

四、An open box is to be made form a square sheet of paper 12 centimeters on a side by cutting small squares from each of the corners and turning up the edges. What are the dimensions of the resulting box if its volume is to be a maximum? (10%)

五、 Evaluate $\lim_{n\to\infty}(1+\dfrac{r}{n})^{nt}$, where r and t are constant (10%)

六、Find the area of the region between the curves $y=x^4$ and $y=2x-x^2$. (10%)

七、Find each integral of the following: (10%)

$(a)\ \int 2x-x^2-x^4\,dx$　　$(b)\ \int x\ln x\,dx$

八、Evaluate the improper integral $\int_0^3\dfrac{1}{(x-1)^2}dx$　(10%)

九、Use the method of Lagrange multipliers to find the minimum of the function　(20%)

$f(x,y,z)=2xy+6yz+8xz$

Subject to the constraint function $xyz=12000$.