東吳大學 111 學年度暑假轉學生招生考試試題

系級	經濟學系二年級	考試時間	100 分鐘
科目	微積分	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。

請詳述作答過程，僅寫答案者不予計分

1. Find the number a such that the limit
$$\lim_{x\to 3}\frac{x^3+x^2+ax+a}{x^2-x-6}$$
exists and compute its limit. (10%)
2. If $y^3+\frac{1}{2}xy=x$, then find the value of y' at the point with $x=2$. (10%)
3. Show that the equation $6x^5-4x^3+kx=0$ has at least one root that lies in $[-4,4]$. (10%)
4. Evaluate the derivative of the following function
$$f(x)=\frac{xe^{x+1}}{1+e^{\sin x}}. (10\%)$$
5. Evaluate the following integrals
   (a) $\int 3x^3+2x^2+1dx$. (5%)
   (b) $\int_0^1 \frac{e^{3x}}{\sqrt{1+e^{3x}}}dx$. (5%)
   (c) $\int_2^3 \frac{1}{x^2-1}dx$. (5%)
   (d) $\int x3^x dx$. (5%)
6. Find the critical number and the extreme value for the function $f(x)=x^2\ln x$. (10%)
7. Find the absolute maximum and minimum values of the function $f(x,y)=3x^2-6xy+4y$ on the rectangle
$$D=\{(x,y)|0\le x\le 4, 0\le y\le 4\}. (10\%)$$
8. Evaluate the following double integral $\int\int_R (x-2y)dA$, where
$$R=\{(x,y)|-1\le x\le 2, 3\le y\le 5\}. (10\%)$$
9. Evaluate the iterated integral $\int_0^1\int_x^1 \cos(y^2)\,dydx$. (10%)