大同大學 100 學年度研究所碩士班入學考試試題

考試科目:微積分　　所別:事業經營研究所　　

註:本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 可以使用計算器。

1. (a) Determine the domain of the given function $f(t)=\frac{\sqrt{t^2-1}}{t-3}$. (5%)

   (b) Find $\frac{dy}{dx}$ if $y=\sqrt[3]{u}$ and $u=x^4-3x^3-2$. (5%)

   (c) Calculate $\int_0^{+\infty} xe^{-2x}dx$. (5%)

   (d) Find $\lim_{t\to\infty}\frac{\log(x+t)-\log x}{t}$. (5%)

2. A commuter train carries 600 passengers each day from a suburb to a city. It now costs $10 per person to ride the train. A study shows that 100 additional people will ride the train for each $1 reduction in fare. What fare should be charged in order to maximize total revenue? (10%)

3. Find the maximum value for function $f(x)=\frac{\ln x}{x}$, and prove that $\pi^e<e^\pi$. (10%)

4. Calculate $\int_1^3\int_0^1 \frac{2xy}{x^2+1}dxdy$. (10%)

5. $y=e^{\sqrt{x}+\ln x}$, find the derivative of the function (10%)

6. $\int_0^4 e^{\sqrt{x}}dx$, evaluate the definite integral (10%)

7. Find the extreme value(s) of the function $f(x,y)=xy$ subject to the constraint $x^2+4y^2=4$ (first and second order conditions should be used) (10%)

8. $R=\{(x,y)|y\le x\le\sqrt{y}\ ,0\le y\le 1\}$

   (a)求算 $\iint_R (xy)\,dxdy$ 之積分值 (10%)

   (b)承上題，當交換積分次序為 $\int_a^b\int_c^d (xy)\,dydx$ 時，則 c, d 之值各為何 (10%)