元智大學 107 學年度 碩士班 招生試題卷

系(所)別：管理學院財務金融暨會計碩士班　組別：財務金融碩士學程　科目：微積分　用紙第 1 頁共 1 頁

●可使用現行『國家考試電子計算器規格標準』規定第一類之計算機

◎Write down your answers in order. You should include all the necessary calculation.

1. (28%) Find the derivative dy/dx. (7% for each)

   (a) $y=f(x)=\dfrac{e^x+x}{\ln x}$

   (b) $y=f(x)=x^x$

   (c) $y=f(x)=\ln\left(e^{-2x}+\ln 2x\right)$

   (d) $y=f(x)=\left[\dfrac{\left(2x^2+1\right)^3\sqrt{(3x-1)^5}}{\sqrt[3]{2x^3+10}}\right]$

2. (32%) Evaluate the indicated integral. (8% for each)

   (a) $\int\dfrac{1}{\sqrt{x}\left(\sqrt{x}+1\right)}dx$

   (b) $\int x^3e^{x^2}dx$

   (c) $\int_0^1\int_{\sqrt{y}}^1 e^{x^3}dxdy$

   (d) $\int_{-\infty}^{\infty}\dfrac{5x^5+3x^3+x}{6x^6+4x^4+2x^2+1}dx$

3. (10%) Show that if $q(p)$ units of a quantity are demanded when the price is p, the price elasticity of demand is given by the ratio of derivatives $E(p)=-(\ln q)'/(\ln p)'$.

4. (15%) Find the general solution of the separable differential equation, $\dfrac{dQ}{dt}=kQ(C-Q)$, where k and C are positive constants.

5. (15%) Find the third Taylor polynomial of $f(x)=\ln(x+1)$ at $x=0$, and use it to estimate the value of $\int_0^{1/2}\ln(x+1)dx$. Compare your result with its exact value.(*Note*: ln3=1.0986, ln2=0.6931)