淡江大學 102 學年度碩士班招生考試試題

系別：財務金融學系　　　　　科目：微積分

考試日期:3月10日(星期日) 第2節　　　　本試題共 10 大題，1 頁

Each question is 10 point. Please answer all questions.

1. Find the stationary value of the function $y = x^3 - 3x^2 + 5$, and determine whether they give maxima, minima, or points of inflection.

2. Use implicit differentiation to find the partial derivatives $\dfrac{\partial y}{\partial x_1}$ and $\dfrac{\partial y}{\partial x_2}$ implied by the relationship $F(x_1, x_2, y) = 3x_1 x_2 + x_2 y^2 + x_1^2 x_2 y - 10 = 0$

3. Use the Taylor series expansion formula with the Lagrange form of the remainder to find an estimate for the function $f(x) = e^{-x}$. Choose $x_0 = 0$

4. Compute $\displaystyle\int_0^1 \int_{-1}^3 (x^2 y + xy^2 + 2x)\,dy\,dx$

5. Evaluate $\displaystyle\lim_{x \to 0} \frac{5^x - e^x}{x}$

6. Max $y = (x_1 + 2)(x_2 + 1)$ subject to $x_1 + x_2 = 21$

7. Find $\displaystyle\int \left(5e^x - x^{-2} + \frac{3}{x}\right) dx, x \neq 0$.

8. Find $\displaystyle\int x e^{x^2 + 9}\,dx$.

9. Find $\displaystyle\int_e^6 \left(\frac{1}{x} + \frac{1}{1+x}\right) dx$.

10. Graph the function $y = Ae^{-t}$ for nonnegative, A>0, and shade the area under the curve. Write a mathematical expression for this area, and determine whether it is a finite area.