淡江大學九十四學年度轉學生招生考試試題

系別： 商管組二年級　　　　科目：微　積　分

准帶項目請打「V」	
✓	簡單型計算機

節次： 7 月 12 日第 4 節

本試題共 1 頁

一、填充題（共 10 題，每小題 7 分）

請按題號依序作答，並註明小題號。只須寫答案，不必寫出計算過程。

1. If $f(u) = \dfrac{\sqrt{u}}{2} + \dfrac{2}{\sqrt{u}}$, then $\dfrac{df(u)}{du} = $ _____ 。

2. If $f(x) = e^{\ln x} + e^x + \ln(e^x)$, then $\dfrac{df(x)}{dx} = $ _____ 。

3. $\dfrac{d}{dx}\left(\sqrt{1+\sqrt{x}}\right) = $ _____ 。

4. $\dfrac{d}{dx}\left(\dfrac{10}{\sqrt{x}} - 9\sqrt[3]{x^5} + 17\right) = $ _____ 。

5. $\displaystyle\int \dfrac{dx}{x^2 - 4} = $ _____ 。

6. $\displaystyle\int_e^\infty (\ln x)^{-2} \dfrac{1}{x}\,dx = $ _____ 。

7. $\displaystyle\int x^2 \sqrt[3]{x^3 - 1}\,dx = $ _____ 。

8. $\displaystyle\int_{-\infty}^{\infty} \dfrac{e^x}{\left(1+e^x\right)^2}\,dx = $ _____ 。

9. $\displaystyle\int_0^1 \int_y^1 4xy\,dx\,dy = $ _____ 。

10. $\displaystyle\int \dfrac{\sin y \cos y}{\sqrt{1+\sin^2 y}}\,dy = $ _____ 。

二、計算題（共 30 分）必須寫出計算過程，否則不予計分。

1. (10%) Let $f(x) = x^5$ and $g(x) = x^2 + 1$. Compute $\dfrac{d}{dx} f[g(x)]$ and $\dfrac{d}{dx} g[f(x)]$

2. (10%) Find the critical points of the function $f(x) = x^5 - 5x^4 + 5x^3 - 1$ and test each to see if it is a local maximum or minimum. Use the second derivative test if possible, otherwise the first derivative test

3. (10%) Assume that a company sells two products X and Y. Its profit from selling x units of X and y units of Y is given by the function $P(x,y) = 10x + 20y - 0.1(x^2 + y^2)$. If the company can product a total of 100 units of the two products together, find the combination that will maximize its profit.