淡江大學 106 學年度進修學士班轉學生招生考試試題

系別：工組二年級　　科目：微積分　　3-1

考試日期：7 月 19 日(星期三) 第 2 節　　本試題共 10 大題，1 頁

Part I. 填充題：共四大題八小題, 每小題五分, 只要標明題號將答案寫於答案卷上, 不必書寫過程。

1. Find the following limits.
   (a) $\lim_{x\to 1} \dfrac{x^2+x-2}{x^2-1}$.　　(b) $\lim_{x\to 0} \dfrac{\tan(3x)}{\sin(5x)}$.

2 Find the following derivatives.
   (a) Find $\dfrac{dy}{dx}$ if $y = \frac{1}{3}x^3+\frac{1}{2}x^2+x+1$.　(b) Find $\dfrac{dy}{dx}$ if $y = \sqrt{1+\cos(x^2)}$.

3 Evaluate the following indefinite integrals.
   (a) $\displaystyle\int \left(\frac{1}{x^2} - x^2 - \frac{1}{3}\right) dx$.　　(b) $\displaystyle\int \frac{1}{x^2-1}\, dx$.

4 Find the following partial derivatives.
   (a) Find $\dfrac{\partial f}{\partial x}$ if $f(x,y) = e^{x+y+1}$.　(b) Find $\dfrac{\partial f}{\partial y}$ if $f(x,y) = \ln(x+y)$.

Part II. 計算題：共六大題, 每大題十分, 務必書寫計算過程於答案卷上, 否則不予記分。

5. Find an equation of the tangent line to the circle $x^2+y^2 = 1$ at the point $(1/2, \sqrt{3}/2)$.

6. Find where the function $f(x) = \dfrac{x^2-2x+2}{x-1}$ is increasing.

7. Suppose that $F(x) = f(g(x))$ and $g(17) = 13, g'(17) = 15, f'(17) = 2$, and $f'(13) = 6$. Find $F'(17)$.

8. Determine convergence or divergence for the series $\displaystyle\sum_{n=1}^{\infty} \frac{n^2(n+2)!}{n!3^{2n}}$.

9. Find the directional derivative of the function $f(x,y,z) = xy+yz+zx$ at $P_0(1,-1,2)$ in the direction of $\vec{u} = (3/7, 6/7, -2/7)$.

10. Let R be the region in the xy-plane bounded by $y^2 = 3x$ and $x = 2y$. Find the area of R.