淡江大學 93 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　　5-1

准帶項目請打「V」	
	簡單型計算機

本試題共 1 頁

1. (a) $y = \ln(\tan\cdot)$, $y' = ?$ (b) $y = e^x \sin x$, $y' = ?$

2. (a) $y = \int_0^{2x} (t^2+1)^{\frac{3}{2}} dt$, $y' = ?$ (b) $x^2y + y^3 - x = 0$, $y' = ?$

Note: $y' = \frac{dy}{dx}$

3. (a) $\int 2x e^{x^2} dx = ?$ (b) $\int \frac{\ln x}{x} dx = ?$

4. (a) $\lim_{x\to 0} \frac{x}{x} = ?$ (b) $\lim_{x\to 0} x\sin\left(\frac{1}{x}\right) = ?$

5. (a) $\lim_{(x,y)\to(0,0)} \frac{xy}{x^2+y^2} = ?$ (b) $\lim_{(x,y)\to(0,0)} \frac{x^2y}{x^4+y^2} = ?$

6. Find the area of the region R bounded by $y = x^2$ and $y = \sqrt{x}$

7. Find the power series expansion of $\tan^{-1}x$.

8. Suppose R is bounded by $y = \sqrt{1-x^2}$ and the x-axis, find $\iint_R e^{x^2+y^2} dA$.

9. Let $f(x) = \begin{cases} x^2\sin\left(\frac{1}{x}\right) & \text{if } x \neq 0 \\ 0 & \text{if } x = 0, \end{cases}$ is f differentiable at 0? Prove it.

10. Does there exist a function $f(x,y)$ such that the directional derivative $D_u f(0,0)$ exists for every unit vector u but f is <u>not</u> continuous at $(0,0)$? Explain.

每題 10 分