

淡江大學 106 學年度日間部轉學生招生考試試題 7-11

系別：數學學系二年級

科目：微積分

考試日期：7月20日(星期四) 第2節

本試題共 9 大題， 1 頁

1. 填充題：共 4 小題，每題 5 分，只要標明題號將答案寫於答案卷上，不必書寫過程。

(a). Let $f(x) = \int_0^x \sqrt{9+t^2} dt$. Then $f'(4) = ?$

(b). Let $y = \ln(x^3 + 1)$. Then $\frac{dy}{dx} = ?$

(c). Let $f(x, y) = x e^{-xy}$. Find $f_y(1, 0)$?

(d). Find $\int_1^4 \left(\frac{3x+1}{\sqrt{x}} \right) dx = ?$

下列都是計算題，每題 10 分，務必書寫計算過程於答案卷上，否則不予計分。

2. Find $\frac{dy}{dx}$ at $x=1$ if $y = (x^{3/4} \sqrt{x^2 + 8}) / (x+2)^2$.

3. Find the following limits (每小題 5 分)

(a) $\lim_{x \rightarrow -1} \frac{x^2 - 2x - 3}{x + 1}$ (b) $\lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{1}{x-1} \right)$

4. Find the absolute maximum and absolute minimum values of $f(x) = x^3 - 6x^2 + 1$ on $[-1, 3]$.

5. Find the following integrals (每小題 5 分)

(a) $\int \sin^5 x \cos x dx$ (b) $\int x e^x dx$

6. Find an equation of the tangent line to the curve $x^2 + xy + y^2 = 3$ at $(1, 1)$.

7. Find $\iint_R y dA$, where R is the triangular region with three vertices $(0, 0)$, $(1, 0)$ and $(1, 1)$.

8. Find the maximum and minimum values of $f(x, y, z) = 2x + y - 2z$ subject to the constraint $x^2 + y^2 + z^2 = 9$.

9. Find the radius of convergence and the interval of convergence of the power series $\sum_{n=0}^{\infty} \frac{3^n x^n}{n+1}$.