

靜宜大學 103 學年度碩士班招生考試試題

學系：財務與計算數學系

科目：微積分

(1) Prove that $\int_0^9 x^{96} (9-x)^{312} dx = \int_0^9 x^{312} (9-x)^{96} dx$ (10%)

(2) 計算題(沒有過程不予計分) (20%)

(a) $\int x \sin x dx = ?$ (b) $\int \sin \sqrt{x} dx = ?$ (c) $\int \frac{\sin(\ln x)}{x} dx$ (d) $\int_0^1 \ln x dx = ?$

(3) Find $\int_0^1 \int_0^2 ye^{xy} dy dx$? (10%)

(4) 簡答題(沒有過程不予計分)(20%)

(a) $F(x) = \int_1^x \sqrt{3t^3 + 5} dt, F'(1) = ?$ (b) $\int (\frac{d}{dx} \sqrt{3+5x^4}) dx$

(c) $\int_0^4 \sqrt{x^3 + 1} dx = \int_0^1 (?) dx$ (d) If $f'(x) = \frac{x}{1+x^2}$, please find $\frac{d}{dx} f(x^3) = ?$

(5) If $f(x) = ax^3 + bx^2 - 3x + c$ has a local maximum value at $x = -1$ and $(1, \frac{1}{3})$ is an inflection point of the graph of $f(x)$, please find a, b , and c . (10%)

(6) Please find C and $f(x)$ if $\int_1^{x^2} t f(t) dt = x^6 - 3x^4 + C$ (10%)

(7) If $x \cos y = \sin(x+y)$, please find $\frac{dy}{dx} = ?$ (10%)

(8) Let $f(x) = \begin{cases} x \sin \frac{1}{x}, & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}$, (a) Is f continuous at $x=0$? give your reasons. (b) Is f differentiable at $x=0$? give your reasons. (10%)