

東海大學 100 學年度碩士班招生入學考試試題

考試科目：微積分 C 應考系所：國貿系

本試題共 2 頁：第 1 頁 (如有缺損或印刷不清者，應即舉手請監試人員處理)

1.(24%) Find $\frac{dy}{dx}$

(a). $y = (1+x^4)^{\frac{2}{3}}$ (6%) (b). $y = \frac{e^x}{x^2}$ (6%)

(c). $y = x\sqrt{5-x}$ (6%) (d). $y = \ln(x^2 + y^2)$ (6%)

2. (24%) Evaluate the integral

(a). $\int_1^2 \frac{1}{2-3x} dx$ (6%) (b). $\int_1^2 \frac{\ln x}{x^2} dx$ (6%)

(c). $\int_0^1 x^2(1+2x^3)^5 dx$ (6%) (d). $\int x^2 e^x dx$ (6%)

3.(12%) Suppose $z = f(x,y)$ where $x = g(s,t)$, $y = h(s,t)$ and

$$g(1,2) = 3, \quad g_s(1,2) = -1, \quad g_t(1,2) = 4 \quad (g_s = \frac{\partial g}{\partial s})$$

$$h(1,2) = 6, \quad h_s(1,2) = -5, \quad h_t(1,2) = 10$$

$$f_x(3,6) = 7, \quad f_y(3,6) = 8$$

(a). Find $\frac{\partial z}{\partial s}$ where $s=1$ and $t=2$ (6%)

(b). Find $\frac{\partial z}{\partial t}$ where $s=1$ and $t=2$ (6%)

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4. (20%) Evaluate the integral

(a). $\int_1^2 \int_0^2 (y + 2xe^y) dx dy$ (10%)

(b). $\int_0^1 \int_{\sqrt{y}}^1 \frac{ye^{x^2}}{x^3} dx dy$ (10%)

5. (20%) The joint density function for random variables X and Y is

$$f(x, y) = \begin{cases} C(x+y) & \text{if } 0 \leq x \leq 3, 0 \leq y \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

(a). Find the value of the constant C (5%)

(b). Find the probability $P(X \leq 2, Y \geq 1)$ (7%)

(c). Find the probability $P(X + Y \leq 1)$ (8%)