

國立彰化師範大學104學年度碩士班招生考試試題

系所： 企業管理學系

選考丁

科目： 微積分

☆☆請在答案紙上作答☆☆

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Multiple Choices: (2% for each question)

- Find the following limit: $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$.
(A) Does not exist (B) 4 (C) $-\frac{1}{4}$ (D) $\frac{1}{4}$
- Find the following limit: $\lim_{x \rightarrow 2} f(x)$, where $f(x) = \begin{cases} x+5 & \text{if } x < 2 \\ x^2 & \text{if } x \geq 2 \end{cases}$
(A) 7 (B) 0 (C) 4 (D) There is none
- Determine all points of discontinuity for the following function: $f(x) = \frac{2x+1}{x^2+x}$.
(A) -1 (B) 0 and -1 (C) $-\frac{1}{2}$ (D) None
- What is the rate of change of function $f(t)$, $f(t) = \frac{2t-3}{t+5}$ with respect to t when $t = 5$?
(A) $\frac{13}{100}$ (B) $\frac{17}{10}$ (C) 10 (D) $\frac{7}{10}$
- If the total cost of manufacturing a commodity is $C(x) = \frac{1}{8}x^2 + 4x + 200$ dollars when x units are produced, for what value of x is the average cost the least?
(A) 37 (B) 38 (C) 39 (D) 40
- Let $f(x) = 10x^3 - 150 \ln x$, for $x > 0$. Find the minimum value of f for $x > 0$.
(A) $5(5^3 - 15 \ln(5))$ (B) $10(5^3 - 15 \ln(5))$ (C) 0 (D) $50(1 - \ln(5))$
- Evaluate $\int_0^1 \frac{xdx}{(3x^2-7)^2}$, which one is the answer:
(A) 56 (B) $\frac{1}{56}$ (C) $\frac{3}{56}$ (D) 1
- Find the general solution of $\frac{dy}{dx} = \frac{x}{y^2}$.
(A) $y = \sqrt[3]{\frac{3x^2}{2} + C}$ (B) $y = \frac{x^2}{2} + C$ (C) $y = C$ (D) $y = \sqrt[3]{\frac{(2x)^2}{3} + C}$

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9. Evaluate the following improper integral: $\int_0^{\infty} x^3 e^{-x^{4/3}} dx$.

- (A) 1.13 (B) 1.5 (C) 0.75 (D) Undefined

10. Evaluate the following double integral: $\int_3^8 \int_{-4}^4 x^3 y^8 dy dx$

- (A) $\frac{1}{4}$ (B) 15 (C) 0 (D) The integral can't be evaluated

Problems: (8% for each question)

1. Find the derivative of $y = (x^2 - x)^3$

2. Find $\int 2(2x+1)^5 dx$

3. Find $\int 5xe^{-x^2} dx$

4. Evaluate $\int_0^2 |x-1| dx$

5. Find the derivative of $f(x) = \ln(x^2 + 2)$

6. Let $F(x) = \int_{x^3}^{x^2} \frac{1}{x+t} dt$. Please try to find the derivative of $F(x)$. i.e., find $\frac{d}{dx} F(x)$.

7. Try to minimize the function of

$$f(x, y, z) = x^2 + y^2 + z^2, \text{ but subject to the constraint } x + 3y - 2z = 14.$$

8. Please try to evaluate the integration of $F(x) = \int_1^e x^4 \cdot \ln(x) \cdot dx$

9. Please try to evaluate the integration of $F(y) = \int \cos(\sqrt{y}) dy$.

10. Please try to evaluate the following iterated integral: $I = \int_0^{\pi} \int_0^1 y \cdot \sin(x) \cdot dx \cdot dy$