

大同大學 104 學年度 (暑) 轉學考試 試題

科目名稱: 微積分 系列: 各系所
註: 本次考試不可參考書籍及筆記

不可使用字典

不可使用計算機

共一頁

1. Evaluate the limits:(每小題8分)

(a) $\lim_{x \rightarrow -5} \frac{x+5}{\sqrt{x+14}-3}$.

(b) $\lim_{x \rightarrow -2^-} \left(\frac{x^2-1}{2x+4} \right)$

2. Find the derivatives $\frac{dy}{dx}$ of the following:(每小題8分)

(a) $y = \sqrt[5]{x} - \frac{1}{\sqrt[5]{x}}$

(b) $y = \tan^8(3x^2)$.

(c) $4y^3 + \ln(x^2 + y^2) + 2x = 2$.

3. Let $f(x) = (4x^2 - 9)^{2/3}$. (10分)

(a) Find the relative extrema of $f(x)$.

(b) Determine the open intervals on which $f(x)$ is increasing or decreasing.

4. Find all extreme values of the function $f(x, y) = x^3 - 3xy + y^3$. (8分)

5. Evaluate the following:(每小題10分)

(a) $\int \frac{4x^2 - 5x + 3}{x^3 - 3x - 2} dx$.

(b) $\int_0^{\frac{\pi}{2}} \frac{\sin t}{1 + \cos t} dt$

6. Find $\int_0^1 \int_y^1 e^{y/x} dx dy$. (8分)

7. The combined electrical resistance R of R_1 and R_2 connected in parallel is given by (14分)

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

where R , R_1 , and R_2 are measured in ohms.

If R_1 and R_2 are increasing (增加) at rates of 1 and 1.5 ohms per second respectively, at what rate is R changing when $R_1 = 50$ ohms and $R_2 = 75$ ohms?