

大同大學 105 學年度 (暑) 轉學考試 試題

科目名稱: 微積分 系列: 各系
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) $\lim_{x \rightarrow -2} \frac{x^2 - x - 6}{x + 2}$.

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

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

(a) $y = e^x \cdot \cos(2\pi x)$

(b) $y = (3x^2 + 2x - 4) \left(\frac{1}{x} + x\right)^2$.

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

3. Let $f(x) = x - \cos(x)$ on the interval $[0, 2\pi]$.

(a) Find the relative extreme of $f(x)$. (4分)

(b) Determine the open intervals on which $f(x)$ is increasing or decreasing on $[0, 2\pi]$. (6分)

(c) Determine the open intervals on which $f(x)$ is concave upward or concave downward on $[0, 2\pi]$. (6分)

4. Find all extreme values of the function $f(x, y) = y^3 - 3yx^2 - 3y^2 - 3x^2 + 1$. (8分)

5. Evaluate the following:(每小題10分)

(a) $\int e^{2x} \cdot \cos(3x) dx$.

(b) $\int_0^{\frac{\pi}{4}} \frac{\sec^2(t)}{1 + \tan(t)} dt$

6. Evaluate the following:(每小題8分)

(a) $\int_0^1 \int_0^{2y} (9 + 3x^2 + 3y^2) dx dy$.

(b) $\int_0^2 \int_0^{\sqrt{4-x^2}} (x^2 + y^2)^{3/2} dy dx$ by converting to polar coordinates.