

大同大學 103 學年度 (寒) 轉學考試 試題

科目名稱: 微積分 系別: 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6分)

(a) $\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x - 3}$.

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

(c) $\lim_{x \rightarrow 0} \frac{\sin(8x)}{\sin(9x)}$.

2. Find the derivative (導函數) $\frac{dy}{dx}$ of the followings:(每小題6分)

(a) $y = e^{x^2} \cdot \sin(x)$.

(b) $y = (x^{1/2} - 1)^{1/2}$.

(c) $y = \frac{3x - 5e^x}{x^3 + 5x}$.

(d) $x + 2x^3y + y^2 = 3$.

3. Find the equation of the tangent line (切線) to the curve $y = \frac{x-1}{x+2}$ at $(4, \frac{1}{2})$. (10分)

4. Find all extrema (極值) for $y = x - 2 \ln(x)$ on the interval $[1, 3]$. (12分)

5. The management of a department store has decided to enclosed an 1600 ft² rectangular area outside the building for displaying potted plants and flowers. One side will be formed by the external wall of the store, and two opposite sides will be constructed of pine boards, and the fourth side will be made of steel fencing material. If the pine board costs \$6/running foot, and the steel costs \$3/running foot, determine the dimensions of the enclosed area that can be erected at minimum cost. (12分)

6. Evaluate the following integrals:(每小題6分)

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

(b) $\int x(x^2 + 9)^5 dx$.

(c) $\int \frac{1}{1 + e^x} dx$.

(d) $\int_1^2 x \ln(x) dx$.