中原大學 102 學年度 碩士班 入學考試

102/3/2 10:00 ~ 11:30 企業管理學系

誠實是我們珍視的美德，
我們喜愛「拒絕作弊，堅守正直」的你！

科目： 微積分　　　　　　　　　　　　　　　　　　　（共 1 頁第 1 頁）
■可使用計算機，惟僅限不具可程式及多重記憶者　　□不可使用計算機

1. Find the inverse function of $f(x) = \sqrt{x-3}$. [5%]

2. Determine the imit. [10%]

   (1) $\lim\limits_{x \to 2} \dfrac{x^2 - 3x + 2}{x^2 + x - 6}$　　　　(2) $\lim\limits_{x \to 3} \dfrac{|x-3|}{x-3}$

3. Find the derivative of the function. [10%]

   (1) $f(x) = \dfrac{2x}{\sqrt{x-1}}$　　　　(2) $f(x) = x\cos\sqrt{x}$

4. Find dy/dx for the equation $x^2 + xy - y^3 = 8$ and evaluate the derivative at the point $(0, -2)$. [10%]

5. Analyze the graph of $f(x) = \dfrac{x^2}{x-1}$. [10%]

6. Use the differential to estimate $\sqrt[3]{26}$. [10%]

7. Evaluate the definite integral. [15%]

   (1) $\int_0^1 x^2 e^x dx$　　　　(2) $\int_0^{\frac{\pi}{2}} \cos x \sqrt{1 - \sin x} \, dx$　　　　(3) $\int_1^2 \dfrac{3}{2x^2 + x - 1} dx$

8. Apply the Trapezoidal Rule to estimate the value of $\int_1^3 \dfrac{1}{x} dx$ such that the approximation error is less than 0.06. [10%]

9. A real estate company handles a 60-unit apartment complex. When the rent is $1200, all units are occupied. For each $40 increase in rent, however, an average of one unit becomes vacant. Each rented unit requires an average of $80 per month for service and repairs. Find the appropriate rent should be charged to maximize profit? [10%]

10. A store's weekly profit depended on two goods is given by
    $p = 300x + 600y + 2xy - 7000$.

    Estimate the average weekly profit if x varies between 50 and 60 units and y varies between 40 and 50 units. [10%]