

中原大學 95 學年度碩士班入學考試

3 月 18 日 14:00~15:30 企業管理系乙組

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 2 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

In Problem 1 through 5, find the derivatives and integrals of the following functions. (40%)

$$f(x) = \frac{(x-1)^2}{\sqrt{x}} \quad (x > 0),$$

$$g(x) = \frac{(\ln x)^3}{x} \quad (x > 0),$$

$$h(x) = \frac{1}{\sqrt{x}(1+\sqrt{x})} \quad (x > 0),$$

$$F(x) = x \cdot \sqrt[3]{3x^2 - 4}$$

$$G(x) = x^k + k^x \quad (k \text{ is constant})$$

01. Find (a) $f'(x) = ?$

(b) $\int f(x)dx = ?$

02. Find (a) $g'(x) = ?$

(b) $\int_1^e g(x)dx = ?$

03. Find (a) $h'(1) = ?$

(b) $\int_1^4 h(x)dx = ?$

04. Find (a) $F'(2) = ?$

(b) $\int F(x)dx = ?$

05. Find (a) $G'(x) = ?$

(b) $\int G(x)dx = ?$

06. (10%) Find numbers A, B and C such that the relative maximum and minimum points on the graph of function $f(x) = Ax^3 + Bx^2 + Cx$ are $(-2, 16)$ and $(2, -16)$ respectively.

中原大學 95 學年度碩士班入學考試

3 月 18 日 14:00~15:30 企業管理系乙組

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 2 頁第 2 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

07. (16%) Suppose $f(x) = \begin{cases} x^2 + \frac{|x|}{x} & \text{if } x \neq 0 \\ -1 & \text{if } x = 0 \end{cases}$

(a) Sketch the graph of $y = f(x)$

(b) Find the area of the region bounded by the graph of $y = f(x)$

and two lines $x = 0$ and $y = 0$.

08. (10%) Let $\mu = xy + f(xy)$ find $x \frac{\partial \mu}{\partial x} - y \frac{\partial \mu}{\partial y} = ?$

09. (14%) By using integration by parts, find

(a) $\int (\ln x)^2 dx$

(b) $\int x^2 e^{-x} dx$

10. (10%) Find the maximum and minimum values of the function

$f(x, y) = xy$ subject to the constraint $4x^2 + 9y^2 = 36$.