

系所組別：民航研究所甲、乙組

考試科目：微積分

考試日期：0222，節次：3

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. 20%)

Consider the function $f(x, y) = x^2 y^4$ At (1,1) what is:

- the rate of change of f in the direction of (1,0)?
- the rate of change of f in the direction of (1,-1)?
- the rate of change of f in the direction of (0,1)?

2. 20%)

Evaluate

a) $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

b) $\lim_{x \rightarrow \pi/2^+} \frac{\tan x}{\tan(3x)}$

3. 20%)

Evaluate

a) $\int_1^5 \frac{dx}{(x-2)^{1/3}}$

b) $\int_2^\infty \frac{dx}{x^2 + 6x + 5}$

4. 20%)

Find the general solutions:

a) $\frac{d^2 y}{dx^2} - 10 \frac{dy}{dx} + 25y = 0$

b) $\frac{d^2 y}{dx^2} + 3 \frac{dy}{dx} + 2y = 4x^2$

(背面仍有題目,請繼續作答)

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5. 20%)

A revenue function is

$$R(x, y) = x(100 - 6x) + y(192 - 4y)$$

where x and y denote the number of items of two commodities sold. Given that the corresponding cost function is

$$C(x, y) = 2x^2 + 2y^2 + 4xy - 8x + 20$$

Find the maximum profit. [Profit = revenue - cost]