

系所組別： 民航研究所

考試科目： 微積分

考試日期： 0225，節次： 3

1) Find the extrema for

$$f(x, y) = 4x^2 + 2y^2 - 2xy - 10y - 2x$$

And determine it is a relative minimum or maximum. (20分)

2) Let

$$F = (x^2 y^3 - z^4, 4x^5 y^2 z, -y^4 z^6)$$

Compute $\text{curl}(F)$ and $\text{div}(F)$. (20分)

3) Find the general solutions:

a) $4xy + 3x^2 y^2 + (2x^2 + 2x^3 y) \frac{dy}{dx} = 0$ (10分)

b) $\frac{d^2 y}{dx^2} - 6 \frac{dy}{dx} + 9y = 0$ (10分)

4) 求下列積分值

a) $\int x^3 \ln(x) dx$ (10分)

b) $\int \frac{x^2}{\sqrt{9-x^2}} dx$ (10分)

5) a) Let region R be bounded by the graphs of $y=1$, $y=2$, $y=x$, and $y=-x+5$.Please plot the region R . (10分)

b) Compute $\iint_R e^{x+3y} dx$ (10分)