

求解微分方程式  $(x^2 + 4xy)dx + (2x^2 + y)dy = 0$ . [97 海洋運航 1]

[解]  $M = x^2 + 4xy \Rightarrow \frac{\partial M}{\partial y} = 4x$

$$N = 2x^2 + y \Rightarrow \frac{\partial N}{\partial x} = 4x$$

$$\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y} \Rightarrow \text{原式為正合微分方程式}$$

$$u = \int x M dx + k(y) = \int x(x^2 + 4xy) dx + k(y) = x^3/3 + 2x^2y + k(y)$$

$$\frac{\partial u}{\partial y} = N \Rightarrow 2x^2 + k'(y) = 2x^2 + y \Rightarrow k'(y) = y \Rightarrow k(y) = y^2/2$$

解為  $x^3/3 + 2x^2y + y^2/2 = C$

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