Subject | موضوع الدرس

section 2

★ Exact

$M(x,y)\,dx + N(x,y)\,dy = 0$ $\quad \frac{dM}{dy} = \frac{dN}{dx}$ → Exact

$u = \int M\,dx + C_1$

$u = \int N\,dy + C_2$

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① $(2x\cos y + 3x^2 y)\,dx + (x^3 - x^2\sin y - y)\,dy = 0$

$\frac{\partial m}{\partial y} = -2x\sin y + 3x^2$, $\frac{\partial n}{\partial x} = 3x^2 - 2x\sin y$ → $\frac{\partial m}{\partial y} = \frac{\partial n}{\partial x}$

$u = \int (2x\cos y + 3x^2 y)\,dx = x^2\cos y + x^3 y + C_1(y)$

$u = \int (x^3 - x^2\sin y - y)\,dy = x^3 y + x^2\cos y - \frac{y^2}{2} + C_2(x)$

$x^2\cos y + x^3 y - \frac{1}{2}y^2 = C$

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② $(2y^2 + 4xy - x^2)\,dx + (2x^2 + 4xy - y^2)\,dy = 0$

$\frac{\partial m}{\partial y} = 4y + 4x$ $\quad = \frac{\partial N}{\partial x} = 4y + 4x$ exact

$u = \int (2y^2 + 4xy - x^2)\,dx = 2xy^2 + 2x^2 y - \frac{x^3}{3} + C_1(x)$

$u = \int (2x^2 + 4xy - y^2)\,dy = 2yx^2 + 2xy^2 - \frac{y^3}{3} + C_2(y)$

$= 2x^2 y + 2y^2 x - \frac{x^3}{3} - \frac{y^3}{3} = C$

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Date التاريخ

(3) $(2xy - \tan y)\,dx + (x^2 - x\sec^2 y)\,dy = 0$

$\frac{\partial M}{\partial y} = 2x - \sec^2 y = \frac{\partial n}{\partial x} = 2x - \sec^2 y$ exact

$u = \int (2xy - \tan y)\,dx = x^2 y - x\tan y + c_1(x)$

$u = \int x^2 - x\sec^2 y\,dy = x^2 y - x\tan y + c_2(x)$

$C = x^2 y - x\tan y$