

Q2

$$(4x^3y^2 + 5x^2y + 6xy)dx + (x^4y + 5y^3 + 3y^2)dy$$

$M(x, y)$

$N(x, y)$

$$\frac{\partial M}{\partial y} = 8x^3y + 5x^2 + 6x$$

$$\frac{\partial N}{\partial x} = 4x^3y$$

Not equal
not exact

$$\frac{\partial}{\partial y} (\mu(x)M) = \frac{\partial}{\partial x} (\mu(x)N)$$

$$\frac{d\mu}{dy} = \mu \frac{\partial M}{\partial y} - M \frac{\partial N}{\partial y} - \mu \frac{\partial N}{\partial x}$$

Sona ERSOY
040200434

LAMA

$$\frac{1}{M} \frac{\partial M}{\partial y} - \frac{1}{N} \frac{\partial N}{\partial x} = \frac{1}{\mu} \frac{dy}{dx}$$

$$\frac{8x^3y + 5x^2 + 6x - 4x^3y}{4x^3y^2 + 5x^2y + 6xy} = \frac{1}{\mu} \frac{d\mu}{dx}$$

$$\frac{5x^2 + 6x + 4x^3y}{4x^3y^2 + 5x^2y + 6xy} = \frac{1}{\mu} \frac{d\mu}{dx}$$

$$\left(\frac{4x^2y + 5x + 6}{4x^3y^2 + 5xy + 6y} dx \right) = \int \frac{1}{\mu} \frac{d\mu}{dx} dx$$

$\ln |\mu|$

$$\mu = \frac{1}{y}$$

$$(4x^3y + 5x^2 + 6x) dx + (x^4 + 5y^2 + 3y + 1) dy = 0$$

$$4x^3 = \mu y$$

$$4x^3 = N x \rightarrow \text{Exact}$$

$$4x^3 y + 5x^2 + 6x dx \rightarrow x^4 y + \frac{5x^3}{3} + 3x^2 + h(y)$$

$$\int (x^4 + 5y^2 + 3y + 1) dy$$

$$= x^4 y + \frac{5y^3}{3} + \frac{3y^2}{2} + y + h(x)$$

$$h(y) = \frac{5y^3}{3} + \frac{3y^2}{2} + y$$

$$h(x) = \frac{5x^3}{3} + 3x^2$$

$$* x^4 y + \frac{5y^3}{3} + \frac{3y^2}{2} + y + \frac{5x^3}{3} + 3x^2 = C$$