

NAMA : ADILLA KUSUMA DEWI

NIM : 18305141047

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TUGAS PERSAMAAN DIFFERENSIAL

Bagaimanakah ide kalian untuk menentukan fungsi $M(x,y)$ sedemikian sehingga PD berikut merupakan PD Eksak.

$$M(x,y) dx + (2x^2y^3 + x^4y) dy = 0$$

Jawab:

Syarat PD Eksak : $\frac{\partial M}{\partial y}(x,y) = \frac{\partial N}{\partial x}(x,y)$

① $N(x,y) = 2x^2y^3 + x^4y$

$$\frac{\partial N}{\partial x}(x,y) = 4xy^3 + 4x^3y$$

② $\frac{\partial M}{\partial y}(x,y) = \frac{\partial N}{\partial x}(x,y)$

$$\frac{\partial M}{\partial y}(x,y) = 4xy^3 + 4x^3y$$

sehingga didapat $\frac{\partial M}{\partial y}(x,y) = 4xy^3 + 4x^3y$,

③ maka $M(x,y)$ dapat dicari dengan $\int \frac{\partial M}{\partial y}(x,y)$

$$\int \frac{\partial M}{\partial y}(x,y) = \int 4xy^3 + 4x^3y$$

$$M(x,y) = 4x \cdot \frac{1}{4}y^4 + 4x^3 \cdot \frac{1}{2}y^2 + \phi(x)$$

$$M(x,y) = xy^4 + 2x^3y^2 + \phi(x)$$

Jika $\phi(x)$ dianggap nol, maka $M(x,y) = xy^4 + 2x^3y^2$
fungsi

Sedemikian sehingga PD eksak yang terbentuk

$$(xy^4 + 2x^3y^2)dx + (2x^2y^3 + x^4y)dy = 0$$