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

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

Persamaan diferensial biasa disebut PD Eksak, jika

$$M(x,y) = \frac{\partial F}{\partial x}(x,y) \quad \text{dan} \quad N(x,y) = \frac{\partial F}{\partial y}(x,y)$$

$$N(x,y) = 2x^2y^3 + x^4y$$

$$\frac{\partial M}{\partial y}(x,y) = \frac{\partial^2 F}{\partial y \partial x}(x,y) \quad \text{dan} \quad \frac{\partial N}{\partial x}(x,y) = \frac{\partial^2 F}{\partial x \partial y}(x,y)$$

$$\bullet N(x,y) = 2x^2y^3 + x^4y$$

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

Suatu PD dikatakan Eksak jika

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

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

$$\begin{aligned} \bullet M(x,y) &= \int \frac{\partial M}{\partial y}(x,y) dy \\ &= \int (4xy^3 + 4x^3y) dy \\ &= xy^4 + 2x^3y^2 + C, \quad C=0 \end{aligned}$$

fungsi $M(x,y) = xy^4 + 2x^3y^2$, sedemikian sehingga

PD $(xy^4 + 2x^3y^2) dx + (2x^2y^3 + x^4y) dy$ merupakan PD Eksak