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Matematika & 18

Tugas diskusi dalam forum

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

Suatu PD dikatakan PD eksak apabila: $\frac{\partial M(x,y)}{\partial y} = \frac{\partial N(x,y)}{\partial x}$

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

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

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

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

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

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

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

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

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

sedemikian sehingga PD eksak yang terbentuk:

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