Latihan Soal 3

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Kuy Tutor

1 Total diferensial of

$w = x^4y^3z^2 + x^3y^2 + x^2z + y + 3$

$(2,1,1)$

$$\frac{dw}{dt} = \frac{\partial w}{\partial x}dx + \frac{\partial w}{\partial y}dy + \frac{\partial w}{\partial z}dz$$

$$\frac{\partial w}{\partial x} = y^3z^2 4x^3 + y^2 3x^2 + z2x$$
$$= (1)(1)4(8) + (1)3(4) + 4$$
$$= 32 + 12 + 4 = 48$$

$$\frac{\partial w}{\partial y} = x^4z^2 3y^2 + x^3 2y + 1$$
$$= 16(9) + 8(2) + 1$$
$$= 48 + 16 + 1 = 65$$

$$\frac{\partial w}{\partial z} = x^4y^3 2z + x^2$$
$$= 16(2) + 4$$
$$= 32 + 4 = 36$$

$$\frac{dw}{dt} = 48\,dx + 65\,dy + 36\,dz$$

2 $f(x,y) = x^2 - y^2$; $p = (1,2)$

a) Vektor gradient $\nabla f(p)$

$$\nabla f(x,y) = \frac{\partial f}{\partial x}\bar{i} - \frac{\partial f}{\partial y}\bar{j}$$

$$= 2x\,\bar{i} - 2y\,\bar{j}$$

$$\nabla f(1,2) = 2\bar{i} - 4\bar{j}$$

b) Vektor satuan u sehingga $D_u f(p)$

maks $D_u f(p) = u \cdot \nabla f(p)$
$= |u|\,|\nabla f(p)| \cdot \cos\theta$
$\cos\theta = 1$

$u_1 2\bar{i} - u_2 4\bar{j} = |u|\,|\sqrt{20}|$

$$\frac{u_1 2 - u_2 4}{\sqrt{20}} = |u| = 1$$

$$\frac{u_1 - u_2 2}{\sqrt{5}}$$

$$u = \frac{1}{\sqrt{5}}\bar{i} - \frac{2}{\sqrt{5}}\bar{j}$$

min : $\cos\theta = -1$

$$\rightarrow \frac{u_1 2 - u_2 4}{-\sqrt{20}} = |u| = 1$$

$$u = -\frac{1}{\sqrt{5}}\bar{i} + \frac{2}{\sqrt{5}}\bar{j}$$

3 Bidang singgung $z = x^2 + y^2$; $(1,1,2)$

$$z = f(1,1,2) + f_x(1,1,2)(x-1) + f_y(1,1,2)(y-1)$$

$$= 2 + 2x - 2 + 2y - 2$$
$$= 2x + 2y - 2$$ //

4 mnat mbak : D nyaa selesai