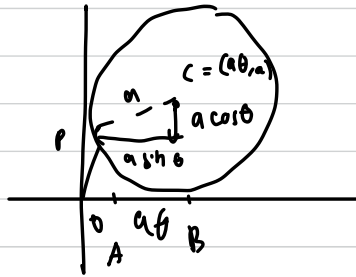


Latihan Serai KUG

Qornam Aj
21/481767 / TK / 53130

$P(x, y)$



a) Persamaan Parametrik

$$\begin{aligned}x &= OA = OB - PD = a\theta - a \sin \theta \\y &= AP = BC - DC = a - a \cos \theta \\r(\theta) &= (a\theta - a \sin \theta, a(1 - \cos \theta)) \\&= (a(\theta - \sin \theta), a(1 - \cos \theta)) \\&= (10(\theta - \sin \theta), 10(1 - \cos \theta))\end{aligned}$$

b) Vektor kecepatan

$$\begin{aligned}V_{\theta} &= r'(\theta) = c'(\theta) \\&= (10 - 10 \cos \theta, 10 \sin \theta)\end{aligned}$$

c) kelajuan :

$$\begin{aligned}\|V(\theta)\| &= \sqrt{(10 - 10 \cos \theta)^2 + (10 \sin \theta)^2} \\&= \sqrt{100 + 100 \cos^2 \theta - 200 \cos \theta + 100 \sin^2 \theta} \\&= \sqrt{200 - 200 \cos \theta} \\&= 10 \sqrt{2 - 2 \cos \theta}\end{aligned}$$

d. Vektor penyimpangan unit

$$= \frac{V(\theta)}{\|V(\theta)\|}$$

2) * $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$, $\frac{\partial f}{\partial z}$ di: $(-3, 2, 0)$

$$f(x, y, z) = x^2 + y^2 + 5xy + z$$

$$\begin{aligned} \text{a) } \frac{\partial f}{\partial x} &= \frac{\partial}{\partial x} (x^2 + y^2 + 5xy + z) \\ &= 2x + 5y = 2(-3) + 5(2) \\ &= 4 // \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{\partial f}{\partial y} &= \frac{\partial}{\partial y} (x^2 + y^2 + 5xy + z) \\ &= 2y + 5x = 2(2) + 5(-3) \\ &= -11 // \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{\partial f}{\partial z} &= \frac{\partial (x^2 + y^2 + 5xy + z)}{\partial z} \\ &= 1 // \end{aligned}$$

* Parsial Derivatif $x \sin(5y + 10z) \cos(2x + 12z)$ terhadap z

$$\frac{\partial f}{\partial z} = \frac{\partial}{\partial z} (x \sin(5y + 10z) \cos(2x + 12z))$$

$$\begin{aligned} &= \frac{\partial f}{\partial z} (x \sin(5y + 10z) (\cos(2x + 12z)) + \\ &\quad x \sin(5y + 10z) \frac{\partial f}{\partial z} (\cos(2x + 12z))) \end{aligned}$$

$$\begin{aligned} &= x \cos(5y + 10z) (10) (\cos(2x + 12z)) + \\ &\quad x \sin(5y + 10z) (-\sin(2x + 12z)) 12 \end{aligned}$$

$$\begin{aligned} &= 10x \cos(5y + 10z) \cos(2x + 12z) - 12x \sin(5y + 10z) \\ &\quad \sin(2x + 12z) // \end{aligned}$$

* Carilah dan tentukan apakah titik kritis
 $f(x,y) = 7x - 8y + 2xy - x^2 + y^3$

Jawab:

$$\begin{array}{l|l} \rightarrow f'_x = 7 + 2y - 2x & f'_{xy} = 0 \\ f''_{xx} = -2 & \end{array}$$

$$\begin{array}{l|l} \rightarrow f'_y = -8 + 2x + 3y^2 & \\ f''_{yy} = 6y & \end{array}$$

$$f'_x = 7 + 2y - 2x = 0$$

$$f'_y = -8 + 2x + 3y^2 = 0$$

$$7 + 2y - 2x = 0$$

$$-2x = -7 - 2y$$

$$2x = 7 + 2y$$

$$x = \frac{7 + 2y}{2}$$

$$-8 + 2\left(\frac{7 + 2y}{2}\right) + 3y^2 = 0$$

$$-8 + 7 + 2y + 3y^2 = 0$$

$$3y^2 + 2y - 1 = 0$$

$$(3y + 1)(y - 1) = 0$$

$$\begin{array}{l|l} y = \frac{1}{3} & x = \frac{7 + \frac{2}{3}}{2} = \frac{21 + 2}{6} \\ y = -1 & = \frac{23}{6} \end{array}$$

$$x = \frac{7 - 2}{2} = \frac{5}{2}$$

$$\left(\frac{23}{6}, \frac{1}{3}\right) \quad \left(\frac{5}{2}, -1\right)$$

$$D(x,y) = f''_{xx}(x,y) f''_{yy}(x,y) - [f'_{xy}(x,y)]^2$$

$$= -2(6y) - (0)^2$$

$$= -12y$$

$$D\left(\frac{23}{6}, \frac{1}{3}\right) = -12\left(\frac{1}{3}\right) = -4 < 0 \quad \text{saddle point}$$

$$D\left(\frac{5}{2}, -1\right) = -6(-1) > 0 \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{local maximum}$$

$$f''_{xx}\left(\frac{5}{2}, -1\right) = -2 < 0$$