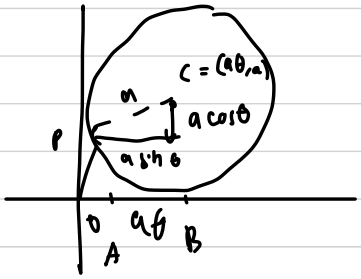
Latihan Soal KUJ

Qornain Aji
21/481767/TK/53170

P(x,y)



a) Persamaan Parametrik

$x = OA = OB - PD = a\theta - a\sin\theta$

$y = AP = BC - DC = a - a\cos\theta$

$r(\theta) = (a\theta - a\sin\theta,\ a(1-\cos\theta))$

$= (a(\theta - \sin\theta),\ a(1-\cos\theta))$

$= (10(\theta - \sin\theta),\ 10(1-\cos\theta))$

b) Vektor kecepatan

$V_\theta = r'(\theta) = c'(\theta)$

$= (10 - 10\cos\theta,\ 10\sin\theta)$

c) kelajuan :

$\|\vec{V}(\theta)\| = \sqrt{(10-10\cos\theta)^2 + (10\sin\theta)^2}$

$= \sqrt{100 + 100\cos^2\theta - 200\cos\theta + 100\sin^2\theta}$

$= \sqrt{200 - 200\cos\theta}$

$= 10\sqrt{2-2\cos\theta}$

d. Vektor singgung unit

$= \dfrac{\vec{V}(\theta)}{\|\vec{V}(\theta)\|} =$

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

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

a) $\frac{\partial f}{\partial x} = \frac{\partial}{\partial x}(x^2 + y^2 + 5xy + z)$

$= 2x + 5y = 2(-3) + 5(2)$

$= 4$ //

b) $\frac{\partial f}{\partial y} = \frac{\partial}{\partial y}(x^2 + y^2 + 5xy + z)$

$= 2y + 5y = 2(2) + 5(-3)$

$= -11$ //

c) $\frac{\partial f}{\partial z} = \frac{\partial (x^2 + y^2 + 5xy + z)}{\partial z}$

$= 1$ //

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

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

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

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

$= x \cos(5y + 10z)(10)(\cos(2x + 12z)) +$

$x \sin(5y + 10z)(-\sin(2x + 12z))\,12$

$= 10x \cos(5y + 10z) \cos(2x + 12z) - 12x \sin(5y + 10z) \sin(2x + 12z)$ //

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

Jawab:

$\Rightarrow f_x = 7 + 2y - 2x \quad | \quad f_{xy} = 0$
$f_{xx} = -2$

$\Rightarrow f_y = -8 + 2x + 3y^2$
$f_y = 6y$

$f_x = 7 + 2y - 2x = 0$
$f_y = -8 + 2x + 3y^2 = 0$

$7 + 2y - 2x = 0$
$-2x = -7 - 2y$
$2x = 7 + 2y$
$x = \frac{7 + 2y}{2}$

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

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

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

$y = \frac{1}{3}$ | $x = \frac{7 + \frac{2}{3}}{2} = \frac{21+2}{6} = \frac{23}{6}$
$y = -1$

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

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

$D(x,y) = f_{xx}(x,y)\, f_{yy}(x,y) - [f_{xy}(x,y)]^2$

$= -2(6y) - (0)^2$
$= -12y$

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

$D\left(\frac{5}{2}, -1\right) = -6(-1) > 0$ } local maksimum

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