Muhammad Raihan Maulana 2306216636
PIP QUIZ 8

1) b.) limit

$$\lim_{(x,y)\to(0,0)} \frac{3xy}{\sqrt{x^2+y^2}} \xrightarrow[\text{polar}]{\text{ubah ke}} \lim_{r\to 0} \frac{3r^2\sin\theta\cdot\cos\theta}{\sqrt{r^2}} = \lim_{r\to 0} 3r\sin\theta\cdot\cos\theta = 0 \quad //$$

* ada limit di 0

dengan
- $r^2 = x^2+y^2$
- $x = r\,\cancel{\sin\theta}\cos\theta$
- $y = r\sin\theta$

2) b) f memiliki limit di (0,0)?

* $f(x,y) = \lim_{(x,y)\to(0,0)} \frac{xy+y^3}{x^2+y^3}$ tes $\lim_{(x,y)\to(0,y)} = \frac{y^3}{y^3} = 1$

~~dengan coor polar~~ $\cancel{\lim_{r\to 0} r^2\sin\theta\cdot\cos\theta +}$

however: ~~then~~ (x,y) approaches $(0,0)$ along $x = y^{3/2}$

$$\lim_{(x,y)\to(0,0)} \frac{y^{5/2}+y^3}{2y^3} = \lim_{(x,y)\to(0,0)} \frac{1}{2y^{1/2}} + \frac{1}{2} = \text{DNE} \to \text{Tidak memiliki limit}$$

* continuity

$D = \{(x,y) \mid x^2+y^3 \neq 0\}$ denominator tidak boleh $= 0$

Selain itu telah dibuktikan pada limit tsb terdapat nilai yg berbeda dari arah yang berbeda, terlebih lagi DNE. Tidak ada limit at (0,0) → Tidak continuous at (0,0) //

Syarat (2) di continuity

3) b.) turunan berarah

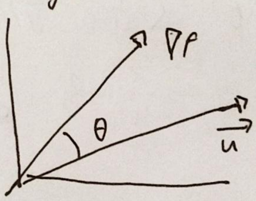
$f(x,y) = \ln(x^2+y^2)$ $\quad \vec{u} = \langle \frac{3}{5}, \frac{4}{5} \rangle \quad p_0 = (1,2)$ $\quad$ * artinya:

$f_x = \frac{2x}{x^2+y^2} \overset{(1,2)}{=} \frac{2}{5}$ $\quad \nabla f_{(1,2)} = \begin{pmatrix} 2/5 \\ 4/5 \end{pmatrix}$

$f_y = \frac{2y}{x^2+y^2} = \frac{4}{5}$

$D_{\vec{u}} f(\bar{p}) = \nabla f(1,2)\cdot\vec{u}$

$= \begin{pmatrix} 2/5 \\ 4/5 \end{pmatrix} \cdot \begin{pmatrix} 3/5 \\ 4/5 \end{pmatrix} = \frac{6}{25} + \frac{16}{25} = \frac{22}{25}$



Turunan berarah dari f terhadap $\vec{u}$ (arah $\vec{u}$)

$\frac{22}{25}$ adalah gradien berarah thdp arah $\vec{u}$

Muhammad Raihan Maulana 2306216636

4) a.) $z = \frac{2x-y}{x+3y}$ $\quad z = 2 - \frac{7y}{x+3y}$

$x(u,v) = e^{2u}\sin 3v \qquad y(u,v) = e^{2u}\cdot\cos 3v$

$\frac{\partial x}{\partial u} = 2e^{2u}\sin 3v \qquad \frac{\partial y}{\partial u} = 2e^{2u}\cos 3v$

$\frac{\partial x}{\partial v} = 3e^{2u}\cos 3v \qquad \frac{\partial y}{\partial v} = -3e^{2u}\sin 3v$

$\frac{\partial z}{\partial x} = \frac{7y}{(x+3y)^2}$

$\frac{\partial z}{\partial y} = \frac{-7x}{3(x+3y)^2}$

$$* \quad \frac{\partial z}{\partial u} = \frac{\partial z}{\partial x}\cdot\frac{\partial x}{\partial u} + \frac{\partial z}{\partial y}\cdot\frac{\partial y}{\partial u} = \frac{7y}{(x+3y)^2}\cdot 2e^{2u}\cdot\sin 3v - \frac{7x}{3(x+3y)^2}\cdot 2e^{2u}\cos 3v \quad //$$

$$* \quad \frac{\partial z}{\partial v} = \frac{\partial z}{\partial x}\cdot\frac{\partial x}{\partial v} + \frac{\partial z}{\partial y}\cdot\frac{\partial y}{\partial v} = \frac{7y}{(x+3y)^2}\cdot 3e^{2u}\cos 3v + \frac{7x}{3(x+3y)^2}\cdot 3e^{2u}\sin 3v \quad //$$

5) a.) $f(x,y) = x^3\sin y + \frac{\cos(2y)}{x}$ $\qquad P_0 = (\frac{1}{2}, \pi)$

subst

$f_x = 3x^2\sin y - \frac{\cos(2y)}{x^2} = \frac{3}{4}\cdot 0 - \frac{1}{1/4} = -4$

$f_y = x^3\cos y - \frac{2\sin(2y)}{x} = \frac{1}{8}\cdot(-1) - \frac{0}{1/2} = -\frac{1}{8}$

Tangen plane : $\langle -4, -\frac{1}{8}\rangle \cdot \langle x - \frac{1}{2}, y - \pi\rangle$

$= -4x - \frac{y}{8} + 2 + \frac{\pi}{8} \quad //$

$\cancel{= \frac{1}{8}(2x - y - 1 - \pi)}$