Kop Quiz 9 - 2206820352 - Juan Maxwell Tanaya
6 7 8 9 10

1a. $f(x,y) = x^6 + y^3 + 6x - 12y + 7$

$f_x(x,y) = 6x^5 + 6$

$f_y(x,y) = 3y^2 - 12$

$\nabla f = \vec{0}$

$\begin{pmatrix} 6x^5+6 \\ 3y^2-12 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

$12x^5 + 12 = 0$

$3y^2 - 12 = 0$ +

$12x^5 + 3y^2 = 0$

$4x^5 + y^2 = 0 \rightarrow y^2 = -4x^5$

$3y^2 - 12 = 0$

$3(-4x^5) = 12$

$-12x^5 = 12$

$x^5 = 6 - 1$

$x = \sqrt[5]{-1}$

$y^2 = -4x^5$

$y^2 = -4(-1)$

$y^2 = 4$

$y = \pm 2$

~~$y = \pm 2x^2\sqrt{x}$~~

	(-1, 2)	(-1, -2)
$f_{xx}(x,y) = 30x^4$	30	30
$f_{yy}(x,y) = 6y$	12	-12
$f_{xy}(x,y) = 0$	0	0
	$D = 360$	$D = 0 - 360$

Karena $f_{xx}(-1,2)$ ~~$= f_{xx}(-1,-2)$~~ > 0 dan $D > 0$, maka titik $(-1,2)$ ~~dan $(-1,-2)$~~ lokal minimum

Karena $f_{xx}(-1,-2) > 0$ dan $D < 0$, maka titik $(-1,-2)$ lokal maksimum

2a. $f(x,y,z) = -2x + 4y + 3z$

$g(x,y,z) = x^2 + 2y^2 - 3z$

$f_x(x,y,z) = -2$ | $g_x(x,y,z) = 2x$

$f_y(x,y,z) = 4$ | $g_y(x,y,z) = 4y$

$f_z(x,y,z) = 3$ | $g_z(x,y,z) = -3$

$\begin{pmatrix} -2 \\ 4 \\ 3 \end{pmatrix} = \lambda \begin{pmatrix} 2x \\ 4y \\ -3 \end{pmatrix}$

$3 = \lambda(-3)$

$-1 = \lambda$

$-2 = \lambda 2x$ | $4 = \lambda 4y$

$-2 = -2x$ | $4 = -4y$

$1 = x$ | $-1 = y$

$g(x,y,z) = 0$

$x^2 + 2y^2 - 3z = 0$

$1^2 + 2(-1)^2 - 3z = 0$

$3 - 3z = 0$

$-3z = -3$

$z = 1$

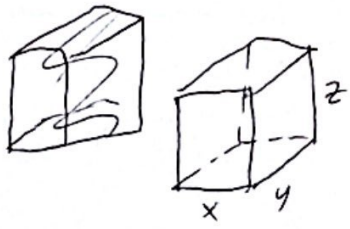
$(x,y,z) = (1,-1,1)$

$f_{xx}(1,-1,1) = -2(1) + 4(-1) + 3(1)$

$= -2 - 4 + 3$

$= -3$

3. $V_0 = 125\,m^3$



$f(x,y,z) = xyz = 125\,m^3$

$4x + 4y + 4z = 0$

$xyz = 125$

$z = \frac{125}{xy}$

$4x + 4y + 4\left(\frac{125}{xy}\right) = 0$

$4x + 4y + \frac{500}{xy} = 0$

$x + y + \frac{125}{xy} = 0 = K(x,y)$

$K_x(x,y) = 1 - \frac{125}{x^2y}$

$K_y(x,y) = 1 - \frac{125}{xy^2}$

$\begin{pmatrix} 1 - \frac{125}{x^2y} \\ 1 - \frac{125}{xy^2} \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

$1 = \frac{125}{x^2y}$ ~~$\rightarrow x^2y = 125$~~

$1 = \frac{125}{xy^2}$

$\frac{125}{x^2y} = \frac{125}{xy^2}$

$\frac{1}{x} = \frac{1}{y}$

$x = y$

$xyz = 125$

$x^2y = 125$

$xyz = x^3$

$x^3 = 125$

$x^2z = x^3$

$x = \sqrt[3]{125}$

$x = z = y$

$x = 5$

~~nilai~~ ~~minimum~~ nilai minimum jumlah Panjang rusuk-rusuk balok

$K = 4x + 4y + 4z$

$= 4x + 4x + 4x$

$= 4(5) + 4(5) + 4(5)$

$= 60\,m$