Pop Quiz 9

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①. ② $f(x,y) = x^3 + y^3 - 150x - 60y + 25$

$\nabla f(x,y) = f_x(x,y) = f_y(x,y) = 0$

$f_x(x,y): 3x^2 - 150 = 0$

$3x^2 = 150$

$x^2 = 50$

$x = \pm\sqrt{50}$

$f_y(x,y): 3y^2 - 60 = 0$

$3y^2 = 60$

$y^2 = 20$

$y = \pm\sqrt{20}$

Semua titik kritis yang mungkin adalah:
$(\sqrt{50}, \sqrt{20})$, $(-\sqrt{50}, -\sqrt{20})$
$(\sqrt{50}, -\sqrt{20})$, $(-\sqrt{50}, \sqrt{20})$

$f_{xx} = 6x$

$f_{yy} = 6y \Rightarrow D(x,y) = 6x \cdot 6y - 0$

$f_{xy} = 0$

Cek semua titik kritis

④ $D(\sqrt{50}, \sqrt{20}) \Rightarrow 6\sqrt{50} * 6\sqrt{20} \Rightarrow 36\sqrt{1000} > 0$ ($f_{xx} > 0$)

↳ karena $D(\sqrt{50}, \sqrt{20}) > 0$ dan $f_{xx} > 0$, maka titik $P(\sqrt{50}, \sqrt{20})$ = titik minimum lokal

② $D(\sqrt{50}, -\sqrt{20}) \Rightarrow 6\sqrt{50} \cdot -6\sqrt{20} \Rightarrow -360$

↳ karena $D(\sqrt{50}, -\sqrt{20}) < 0$, maka titik $P(\sqrt{50}, -\sqrt{20})$ = Saddle point

③. $D(-\sqrt{50}, \sqrt{20}) \Rightarrow -6\sqrt{50} \cdot 6\sqrt{20} \Rightarrow -360$

↳ karena $D(-\sqrt{50}, \sqrt{20}) < 0$, maka titik $P(-\sqrt{50}, \sqrt{20})$ = saddle point

④ $D(-\sqrt{50}, -\sqrt{20}) \Rightarrow -6\sqrt{50} \cdot -6\sqrt{20} = 360$ ($f_{xx} < 0$)

↳ karena $D(-\sqrt{50}, -\sqrt{20}) > 0$ dan $f_{xx} < 0$, maka $P(-\sqrt{50}, -\sqrt{20})$ = titik maksimum lokal

② ⓐ $f(x,y) = x^2y$ $\quad g(x,y) = x^2 + 2y^2 - 6 = c$ ④

↳ $\begin{pmatrix} 2xy \\ x^2 \end{pmatrix} = \lambda \begin{pmatrix} 2x \\ 4y \end{pmatrix}$

→ $2xy = \lambda 2x \quad ; \rightarrow \lambda = y$

→ $x^2 = \lambda 4y \rightarrow$ substitusi $\lambda = y$

↳ $x^2 = \lambda 4\lambda$

$x^2 = 4\lambda^2$

Substitusikan ke persamaan batas / constrain

$4\lambda^2 + 2\lambda^2 - 6 = c$

$6\lambda^2 = 6$

$\lambda^2 = 1$

$\lambda = \pm 1$

Kasus $\lambda = 1$

↳ $y = 1$

↳ $x = \pm 2$

$f(\pm 2, 1) = 4$ (maksimum)

Kasus $\lambda = -1$

↳ $y = -1$

↳ $x = \pm 2$

$f(\pm 2, -1) = -4$ (minimum)

Maka nilai minimum fungsi f adalah -4 ; dan nilai maksimum dari f adalah 4

Dipindai dengan CamScanner

fungsi objektif

$P.L.t$

fungsi Constrain

$PL + 2Pt + 2Lt = 300$

$$\begin{pmatrix} Lt \\ Pt \\ PL \end{pmatrix} = \lambda \begin{pmatrix} L + 2t \\ P + 2t \\ 2P + 2L \end{pmatrix}$$

$Lt = \lambda L + 2\lambda t$

$Pt = \lambda P + 2\lambda t$

$PL = 2\lambda P + 2\lambda L$

$Lt = \lambda L + 2\lambda t$

$Pt = \lambda P + 2\lambda t$ (−)

$t(L-P) = \lambda(L-P)$

$t = \lambda$

$Pt = P + 2t \mid \times 2$

$PL = 2P + 2L$

$\Rightarrow$ $2Pt = 2P + 4t$

$PL = 2P + 2L$ (−)

$P = 2$

$2Pt - PL = 4t - 2L$

~~$P(2t - L) = 2(2t - L)$~~

④ a. $\int_0^1 \int_1^2 x e^{x+4y}\, dy\, dx$

$\Rightarrow \int_0^1 \left[4x e^{x+4y} \Big|_1^2 \right] dx$

$\Rightarrow \int_0^1 4x e^{x+8} - 4x e^{x+4}\, dx$

$\Rightarrow \int_0^1 4x e^{x+8} - \int_0^1 4x e^{x+4}$

	D	I
+	$4x$	e^{x+8}
−	4	e^{x+8}
+	0	e^{x+8}

	D	I
+	$4x$	e^{x+4}
−	4	e^{x+4}
+	0	e^{x+4}

$\Rightarrow 4x e^{x+8} - 4e^{x+8} \Big|_0^1 - 4x e^{x+4} - 4e^{x+4} \Big|_0^1$

$\Rightarrow 4e^9 - 4e^9 - (0 - 4e^8) - \left((4e^5 - 4e^5) - (0 - 4e^4) \right)$

$\Rightarrow 0 - (-4e^8) - (0 - (-4e^4))$

$\Rightarrow 4e^8 - 4e^4$

$= 4(e^8 - e^4)$ //