Tarefa 4 – MN II – 2017.1

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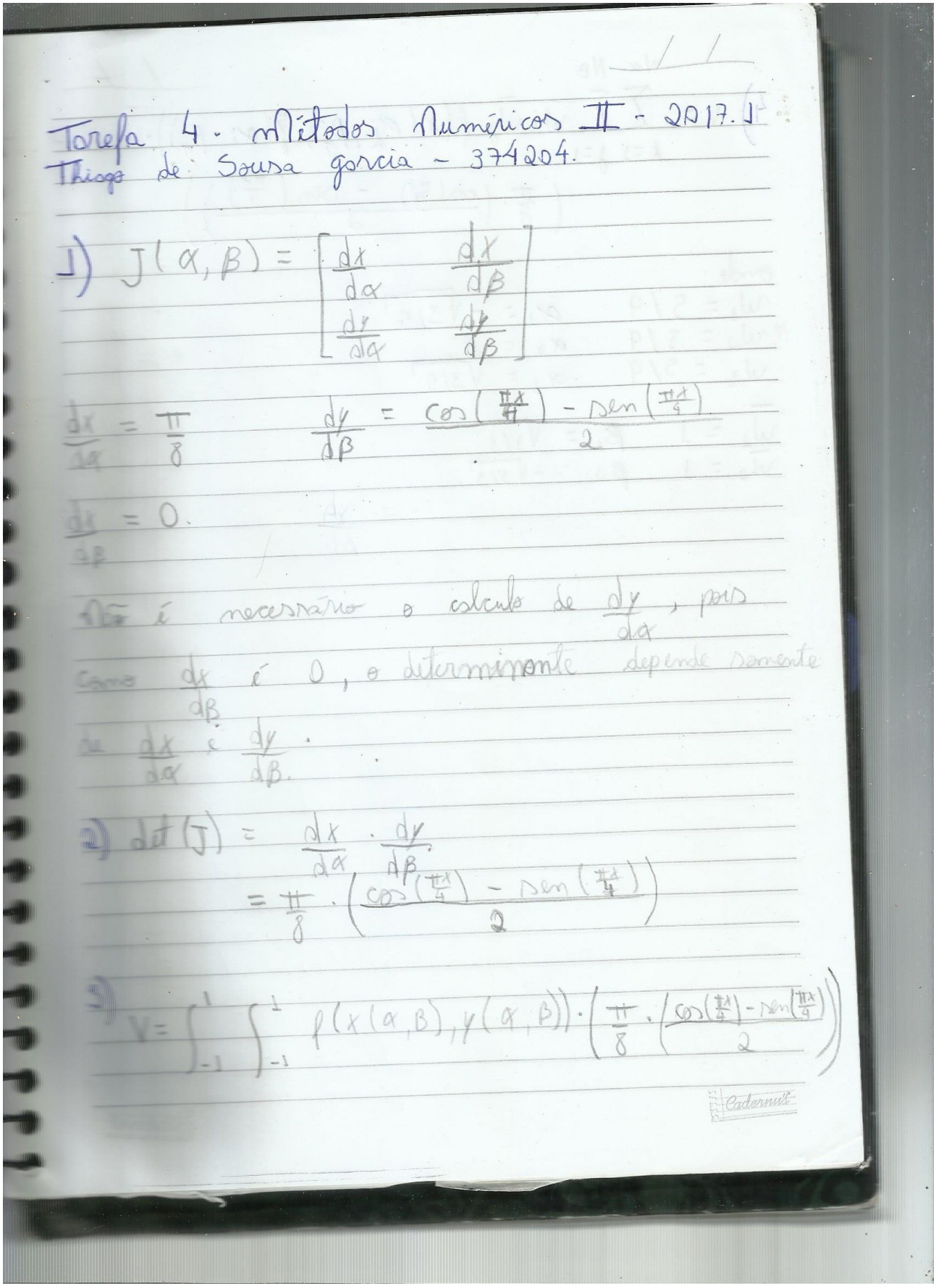

Tarefa 4 - Métodos Numéricos II - 2017.1
Thiago de Sousa Garcia - 374204.

1) $J(\alpha,\beta) = \begin{bmatrix} \frac{dx}{d\alpha} & \frac{dx}{d\beta} \\ \frac{dy}{d\alpha} & \frac{dy}{d\beta} \end{bmatrix}$

$\frac{dx}{d\alpha} = \frac{\pi}{8}$ $\quad \frac{dy}{d\beta} = \frac{\cos\left(\frac{\pi x}{4}\right) - \operatorname{sen}\left(\frac{\pi x}{4}\right)}{2}$

$\frac{dx}{d\beta} = 0.$

Não é necessário o cálculo de $\frac{dy}{d\alpha}$, pois
Como $\frac{dx}{d\beta}$ é 0, o determinante depende somente
de $\frac{dx}{d\alpha}$ e $\frac{dy}{d\beta}$.

2) $\det(J) = \frac{dx}{d\alpha} \cdot \frac{dy}{d\beta}$

$= \frac{\pi}{8} \cdot \left(\frac{\cos\left(\frac{\pi x}{4}\right) - \operatorname{sen}\left(\frac{\pi x}{4}\right)}{2}\right)$

3) $V = \int_{-1}^{1}\int_{-1}^{1} f(x(\alpha,\beta), y(\alpha,\beta)) \cdot \left(\frac{\pi}{8} \cdot \left(\frac{\cos\left(\frac{\pi x}{4}\right) - \operatorname{sen}\left(\frac{\pi x}{4}\right)}{2}\right)\right)$

Caderno

4) $V = \sum_{i=1}^{N\alpha} \sum_{j=1}^{N\beta} w_i \bar{w}_j f\left(x(\alpha_i, \beta_j), y(\alpha_i, \beta_j)\right) \cdot \left(\frac{\pi}{8} \cdot \left(\frac{\cos\left(\frac{\pi x}{4}\right)}{2} - \operatorname{Den}\left(\frac{\pi x}{4}\right)\right)\right)$

onde

$w_1 = 5/9 \quad \alpha_1 = -\sqrt{3/5}$

$w_2 = 8/9 \quad \alpha_2 = 0$

$w_3 = 5/9 \quad \alpha_3 = \sqrt{3/5}$

$\bar{w}_1 = 1 \quad \beta_1 = \sqrt{1/3}$

$\bar{w}_2 = 1 \quad \beta_2 = -\sqrt{1/3}$.