TAREFA 09 - MÉTODOS NUMÉRICOS II

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1. Mudança de Variável 1

$$x(\alpha, \beta) = 40.\alpha.\cos(\beta)$$
$$y(\alpha, \beta) = 20.\alpha.\text{sen}(\beta)$$

↳ substituindo em $f(x,y) = 0,2(x^2 - y^2)$

$$f(\alpha, \beta) = 0,2\left[(40.\alpha.\cos(\beta))^2 - (20.\alpha.\text{sen}(\beta))^2\right]$$

$$= 320.\alpha^2.\cos^2(\beta) - 80.\alpha^2.\text{sen}^2(\beta)$$

2. Mudança de Variável 2.

$$V = \int_0^1 \left[\int_0^{2\pi} \left(320.\alpha^2.\cos^2(\beta) - 80.\alpha^2.\text{sen}^2(\beta)\right) d\beta \right] d\alpha$$

$$\alpha(r,s) = \frac{0+1}{2} + \frac{(1-0)}{2} r = 1/2.(1+r)$$

$$\beta(r,s) = \frac{0+2\pi}{2} + \frac{(2\pi - 0)}{2} s = \pi(1+s)$$

$$J = \begin{bmatrix} \frac{d\alpha}{dr} & \frac{d\alpha}{ds} \\ \frac{d\beta}{dr} & \frac{d\beta}{ds} \end{bmatrix} = \begin{bmatrix} 1/2 & 0 \\ 0 & \pi \end{bmatrix} \rightarrow |J| = \pi/2$$

$$V = \pi/2 \cdot \int_{-1}^{1}\int_{-1}^{1}\int_{-1}^{1} 320\cdot\left(\frac{1}{2}(1+r)\right)^2 \cdot \cos^2(\pi(1+s)) - 80\cdot\left(\frac{1}{2}(1+r)\right)^2 \cdot \operatorname{sen}^2(\pi(1+s)) \, d\beta \, d\alpha$$

3. Resultado do Gauss-Legendre 3 pontos

→ Através do CÓDIGO ANEXO

$V = 267.242822$ ERRO: 10^{-6}