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MATRÍCULA: 422029

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$$f(x,y) = 0{,}2(x^2 - y^2)$$

$$A = \int\int \sqrt{(0{,}4x)^2 + (0{,}4y)^2 + 1}\, dx\, dy$$

Colocando em coordenadas polares:

$$x = \alpha R\cos(\beta)$$

$$y = \alpha R\operatorname{sen}(\beta)$$

$$J_1 = \begin{bmatrix} \frac{\partial x}{\partial \alpha} & \frac{\partial x}{\partial \beta} \\ \frac{\partial y}{\partial \alpha} & \frac{\partial y}{\partial \beta} \end{bmatrix} \rightarrow J_1 = \begin{bmatrix} R\cos\beta & -\alpha R\operatorname{sen}\beta \\ R\operatorname{sen}\beta & \alpha R\cos\beta \end{bmatrix}$$

$$|J_1| = (R\cos\beta \cdot \alpha R\cos\beta) - (-R\operatorname{sen}\beta \cdot \alpha R\operatorname{sen}\beta) =$$

$$= \alpha R^2(\cos^2\beta + \operatorname{sen}^2\beta) = \alpha R^2$$

$$A = R^2 \int_0^{2\pi} \int_0^1 \sqrt{(0{,}4x(\alpha,\beta))^2 + (0{,}4y(\alpha,\beta))^2 + 1}\, .\, \alpha\, d\alpha\, d\beta$$

Colocando em coordenadas de Gauss-Legendre.

$$\alpha(\gamma,\theta) = \left(\frac{1+0}{2} + \frac{1-0}{2}\gamma\right) = \frac{1}{2}(1+\gamma)$$

$$\beta(\gamma,\theta) = \left(\frac{2\pi+0}{2} + \frac{2\pi-0}{2}\theta\right) = \pi(1+\theta)$$

$$J_2 = \begin{bmatrix} \frac{\partial\alpha}{\partial\gamma} & \frac{\partial\alpha}{\partial\theta} \\ \frac{\partial\beta}{\partial\gamma} & \frac{\partial\beta}{\partial\theta} \end{bmatrix} \rightarrow J_2 = \begin{bmatrix} \frac{1}{2} & 0 \\ 0 & \pi \end{bmatrix}$$

$$|J_2| = \frac{\pi}{2}$$

$$A = \frac{R^2\pi}{2}\int_{-1}^{1}\int_{-1}^{1}\sqrt{(0{,}4x(\alpha(\gamma,\theta),\beta(\gamma,\theta)))^2 + (0{,}4y(\alpha(\gamma,\theta),\beta(\gamma,\theta)))^2 + 1}\;\alpha(\gamma,\theta)\,d\gamma\,d\theta$$

| (γ , θ) | $w_i w_j$ | g(@) | ww*g(@) | *800π |
|---|---|---|---|---|
| (-√0.6 , -√0.6 ) | 25/81 | 0.232385 | 0.071724 | 180.261392 |
| (0, -√0.6 ) | 40/81 | 4.031129 | 1.990681 | 5003.126777 |
| (√0.6 , -√0.6 ) | 25/81 | 12.627985 | 3.897526 | 9795.551409 |
| (-√0.6 , 0) | 40/81 | 0.232385 | 0.114758 | 288.418227 |
| (0, 0) | 64/81 | 4.031129 | 3.185089 | 8005.002837 |
| (√0.6 , 0) | 40/81 | 12.627985 | 6.236042 | 15672.882286 |
| (-√0.6 , √0.6 ) | 25/81 | 0.232385 | 0.071724 | 180.261392 |
| (0, √0.6 ) | 40/81 | 4.031129 | 1.990681 | 5003.126777 |
| (√0.6 , √0.6 ) | 25/81 | 12.627985 | 3.897526 | 9795.551409 |
| | | | | 53924.182506 |

$\alpha(\gamma , \theta)*(x(\alpha(\gamma , \theta), \beta(\gamma , \theta))^2 + y(\alpha(\gamma , \theta), \beta(\gamma , \theta))^2 + 1)^{0,5} = g(@)$

SOMA: 53924.182506