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Cálculo II

Integral dupla

a- $\iint_R (y + xy^{-2})\,dA \qquad R = (x,y) \mid 0 \leq x \leq 2 \,,\; 1 \leq y \leq 2$

$$\int_0^2 \int_1^2 (y + xy^{-2})\,dy\,dx$$

Começa com y

$$\int_0^2 \left(\frac{y^2}{2} + x \cdot \frac{y^{-1}}{-1} \Bigg|_{y=1}^{y=2} \right) dx$$

$$\int_0^2 \left(\frac{y^2}{2} - \frac{x}{y} \Bigg|_{y=1}^{y=2} \right) dx = \int_0^2 \left(\left(\frac{2^2}{2} - \frac{x}{2} \right) - \left(\frac{1^2}{2} - \frac{x}{1} \right) \right) dx$$

$$\int_0^2 \left(\frac{4}{2} - \frac{x}{2} - \frac{1}{2} + \frac{2x}{2} \right) dx = \int_0^2 \left(\frac{3}{2} + \frac{x}{2} \right) dx$$

$$-(0+0) + \left(3 + \frac{4}{4}\right) = 3 + 1 = 4$$

$$\iint_R (y + xy^{-2})\,dA = 4$$

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b- $\iint_R \left(\frac{1+x^2}{1+y^2}\right) dA \qquad R = (x,y) \mid 0 \leq x \leq 1,\ 0 \leq y \leq 1$

$$\int_0^1\int_0^1 \frac{1+x^2}{1+y^2}\, dx\, dy$$

$$\left(\int_0^1 1+x^2\, dx\right) \cdot \left(\int_0^1 \frac{1}{1+y^2}\, dy\right)$$

$$\left[x + \frac{x^3}{3}\right]_0^1 \left[\operatorname{arctg} y\right]_0^1 = \left(1 + \frac{1}{3}\right)(\operatorname{ARCTG} 1 - \operatorname{arctg} 0)$$

$$\frac{4}{3} \cdot \left(\frac{\pi}{4} - 0\right) = \frac{\pi}{3}$$

$$\iint_R \left(\frac{1+x^2}{1+y^2}\right) dA = \frac{\pi}{3}$$ //

Refreshing

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c - $\int_1^4 \int_0^2 (6x^2y + 2x)\, dy\, dx$

$\int_1^4 \int_0^2 (6x^2y + 2x)\, dy\, dx$

$\int_0^2 (6x^2 y + 2x)\, dx = 4 + 16y$

$\int_1^4 (4 + 16y)\, dy$

$\int_1^4 (4 + 16y)\, dy = 132$

$\int_1^4 \int_0^2 (6x^2 y + 2x)\, dy\, dx = 132$ //

d - $\int_0^1 \int_1^2 (x + e^{-y})\, dx\, dy$

$\int_0^1 \int_1^2 (x + e^{-y})\, dx\, dy$

$\int_1^2 (x + e^{-y})\, dx = e^{-y} + \frac{3}{2}$

$$\int_0^1 \left(e^{-y} + \frac{3}{2}\right) dy = \frac{5}{2} - \frac{1}{e}$$

$$\int_0^1 \int_1^2 (x + e^{-y})\, dx\, dy = \frac{5}{2} - \frac{1}{e}$$