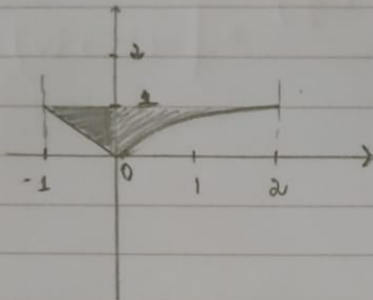


Declaro, sob compromisso de honra, que cumpro as regras da ética académica durante a realização deste teste.

Catarina Quintas

9a)



$$y = -x$$

b) $-x \leq y \leq 1$

$$\int_0^2 \int_{-y}^{2y^2} f(x,y) dx dy$$

$$\sqrt{\frac{x}{2}} \leq y \leq 1 \quad y^2 = \frac{x}{2} \quad x = 2y^2$$

c)

$$\int_{-1}^0 \int_{-x}^1 (2x+y) dy dx + \int_0^2 \int_{\sqrt{x/2}}^1 (2x+y) dy dx$$

$$\int_{-1}^0 \left[2x + \frac{y^2}{2} \right]_{-x}^1 dx + \int_0^2 \left[2x + \frac{y^2}{2} \right]_{\sqrt{x/2}}^1 dx$$

$$\int_{-1}^0 \left[2x + \frac{1}{2} + 2x - \frac{x^2}{2} \right] dx + \int_0^2 \left[\frac{1}{2} - \frac{x}{4} + 2x - 2x \sqrt{\frac{x}{2}} \right] dx$$

$$\left[x^2 + \frac{1}{2}x + \frac{2}{3}x^3 - \frac{x^3}{6} \right]_{-1}^0 + \left[\frac{1}{2}x - \frac{x^2}{8} + x^2 - \frac{2\sqrt{2}}{5} x^{\frac{5}{2}} \right]_0^2$$

$$-(1 - \frac{1}{2} - \frac{2}{3} + \frac{1}{6}) + \frac{10}{13} = 0 + \frac{10}{13}$$

$$= \frac{10}{13}$$

10) a) $f(x, y) = 2x + xe^y$

$r_1(t) = \sqrt{(\cos t)^2 + (\sin t)^2}$

$n_1 \cdot \int_0^{\frac{\pi}{2}} (2 \sin t + \sin t e^{\cos t}) \cdot x(1) dt$

$\left[-2 \cos(t) - e^{\cos(t)} \right]_0^{\frac{\pi}{2}}$

$= -2 \cos\left(\frac{\pi}{2}\right) - e^{\cos\left(\frac{\pi}{2}\right)} - \left(-2 \cos(0) - e^{\cos(0)} \right)$

$= e + 1$

$n_2 \cdot \int_0^1 (2 + e^t) dt$

$\left(2t + e^t \right)_0^1$

$= 2 + e - 1 = e + 1$

$= 2e + 2$