1. Escreva a integral dupla equivalente, invertendo a ordem de integração para cada um dos problemas abaixo. Verifique o resultado, calculando ambas as integrais

   a) $\int_0^2 \int_1^{e^x} dy\,dx$ b) $\int_0^1 \int_{\sqrt{y}}^1 dx\,dy$ c) $\int_0^{\sqrt{2}} \int_{-\sqrt{4-2y^2}}^{\sqrt{4-2y^2}} y\,dx\,dy$ d) $\int_{-2}^1 \int_{x^2+4x}^{3x+2} dy\,dx$

2. Calcule as integrais abaixo

   (a) $\iint_B xye^{2x^2-y^2}dxdy$, $B = [-1,1] \times [0,1]$;

   (b) $\iint_B xy\ dxdy$, $B = \{(x,y); x^2+y^2-2y \leq 0\}$;

   (c) $\iint_B \sqrt{4x^2+9y^2}\ dxdy$, $B = \{(x,y); 4x^2+9y^2 \leq 1\}$;

   (d) $\iint_B (x^2+y^2)^{-1/2}\ dxdy$, $B = \{(x,y); 1 \leq x^2+y^2 \leq 4\}$;

3. Calcule o volume de cada um dos sólidos abaixo. Procure esboçar o sólido.

   (a) $X = \{(x,y,z) \in \mathbb{R}^3; 0 \leq y \leq 1-x, 0 \leq z \leq 1-x^2, x \geq 0, y \geq 0\}$

   (b) $X = \{(x,y,z) \in \mathbb{R}^3; 0 \leq x \leq y, 0 \leq z \leq 4-y^2\}$

   (c) $X = \{(x,y,z) \in \mathbb{R}^3; 0 \leq y \leq x, z \geq 0, x^2+z^2 \leq 1\}$

Respostas

1. (a) $\int_1^{e^2} \int_{\ln y}^2 dxdy = e^2 - 3$

   (b) $\int_0^1 \int_0^{x^2} dydx = \frac{1}{3}$

   (c) $\int_{-2}^2 \int_0^{\sqrt{(4-x^2)/2}} y\,dydx = \frac{8}{3}$

   (d) $\int_{-4}^5 \int_{(y-2)/3}^{\sqrt{y+4}-2} dxdy = \frac{9}{2}$

2. (a) 0

   (b) 0

   (c) $\pi/9$

   (d) 2π

3. (a) 5/12

   (b) 4

   (c) 1/3