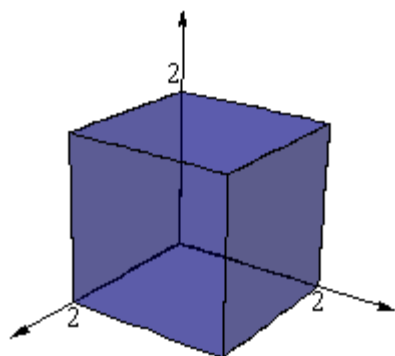


8.

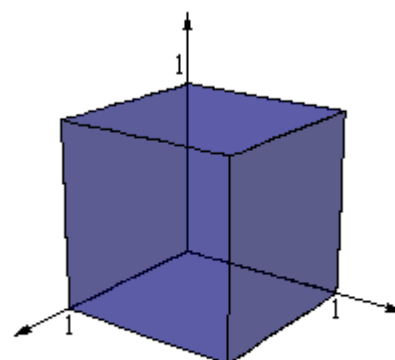
Exercício 8.1

a)



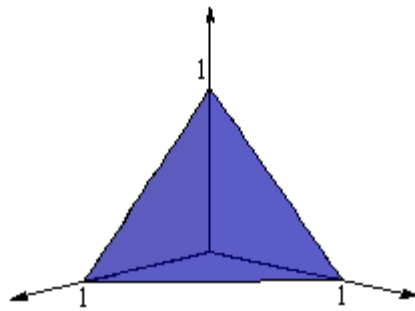
$$24$$

b)



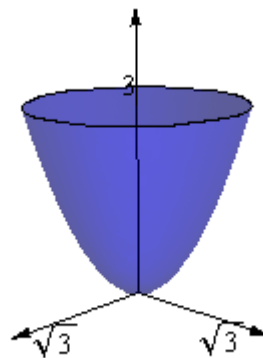
$$\frac{1}{2} (-1 + e)^2$$

c)



$$\frac{1}{120}$$

d)



$$0$$

Exercício 8.2

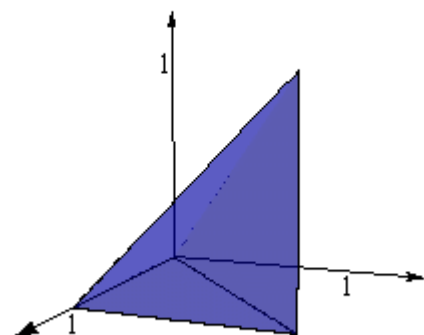
$$\int_{-\sqrt{a}}^{\sqrt{a}} \int_{-\sqrt{a-x^2}}^{\sqrt{a-x^2}} \int_0^{a-x^2-y^2} dz dy dx = \frac{a^2 \pi}{2}$$

Exercício 8.3

$$\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{-2}^2 \frac{\sqrt{4-x^2-y^2}}{\sqrt{4-x^2-y^2}} dz dy dx = \frac{64 \pi}{3}$$

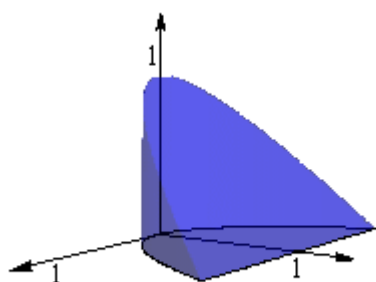
Exercício 8.4

a)



$$\int_0^1 \int_z^1 \int_y^1 f(x, y, z) \, dx \, dy \, dz$$

b)

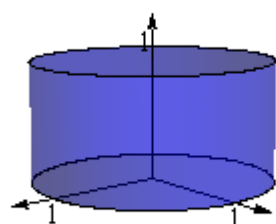


$$\int_0^1 \int_0^{1-z} \int_{-\sqrt{y}}^{\sqrt{y}} f(x, y, z) \, dx \, dy \, dz$$

Exercício 8.5

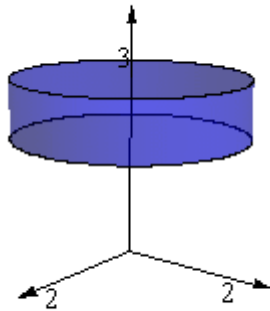
1

Exercício 8.6



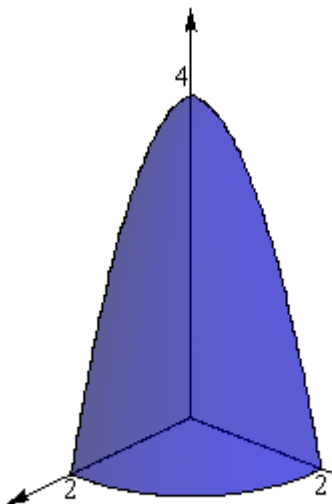
$$\int_0^1 \int_0^{2\pi} \int_0^1 z r^3 \, dz \, d\theta \, dr = \frac{\pi}{4}$$

Exercício 8.7



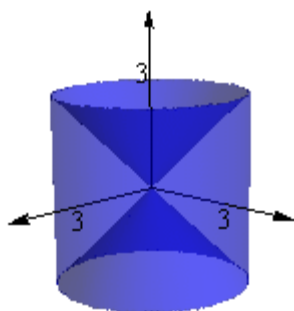
$$\int_0^2 \int_0^{2\pi} \int_2^3 z r \exp[r^2] \, dz \, d\theta \, dr = \frac{5}{2} (-1 + e^4) \pi$$

Exercício 8.8



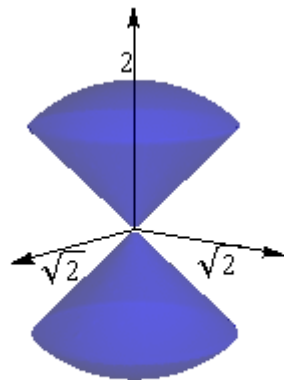
$$\int_0^{\frac{\pi}{2}} \int_0^2 \int_0^{4-r^2} (r^2 \cos[\theta] + r^2 \sin[\theta]) \, dz \, dr \, d\theta = \frac{128}{15}$$

Exercício 8.9



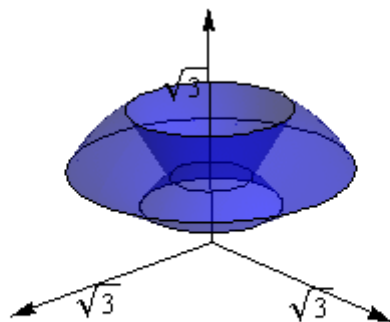
$$\int_0^{2\pi} \int_0^3 \int_{-r}^r r \, dz \, dr \, d\theta = 36\pi$$

Exercício 8.10

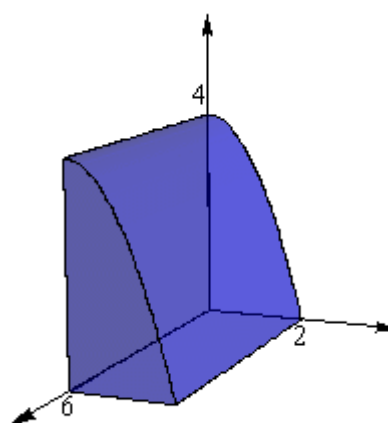


$$\int_0^{\frac{\pi}{4}} \int_0^2 \int_0^{2\pi} \rho^2 \sin[\phi] d\theta d\rho d\phi + \int_{\frac{3\pi}{4}}^{\pi} \int_0^2 \int_0^{2\pi} \rho^2 \sin[\phi] d\theta d\rho d\phi = 2 \int_0^{\frac{\pi}{4}} \int_0^2 \int_0^{2\pi} \rho^2 \sin[\phi] d\theta d\rho d\phi = -\frac{16}{3} (-2 + \sqrt{2}) \pi$$

Exercício 8.11



$$\int_1^2 \int_0^{2\pi} \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \text{Exp}[\rho^3] \rho^2 \sin[\phi] d\phi d\theta d\rho = \frac{1}{3} (-1 + \sqrt{3}) e (-1 + e^7) \pi$$

Exercício 8.12

$$\int_0^6 \int_0^2 \int_0^{4-y^2} 1 \, dz \, dy \, dx = 32$$

Exercício 8.13

a)

$$\int_0^{2\pi} \int_0^{\pi} \int_{\sqrt{3}}^3 \rho^2 \sin[\phi] \, d\rho \, d\phi \, d\theta = -4(-9 + \sqrt{3})\pi$$

b)

$$\int_0^{2\pi} \int_0^{\sqrt{6}} \int_{r^2}^{12-r^2} r \, dz \, dr \, d\theta = 36\pi$$

c)

$$\int_0^{2\pi} \int_0^2 \int_{\frac{r^2}{4}}^1 r \, dz \, dr \, d\theta = 2\pi$$

d)

$$\int_{-2}^2 \int_{-\sqrt{9-\frac{9z^2}{4}}}^{\sqrt{9-\frac{9z^2}{4}}} \int_{y^2+\frac{9z^2}{4}}^9 1 \, dx \, dy \, dz = 27\pi$$

e)

$$\int_0^{2\pi} \int_1^2 \int_0^{r^2} r \, dz \, dr \, d\theta = \frac{15\pi}{2}$$

Exercício 8.14

$$\frac{\pi}{3}$$

Exercício 8.15

a)

$$\frac{\pi}{4}$$

b)

$$\left(\cos[1] - \cos\left[\frac{4 + \pi}{4}\right] \right) \log[2] \sin[1]$$

Exercício 8.16

$$2 \int_0^{2\pi} \int_0^\pi \int_0^r \sqrt{r^2 - \rho^2} \, \rho^2 \sin[\phi] \, d\rho \, d\phi \, d\theta = \frac{\pi^2 r^4}{2}$$