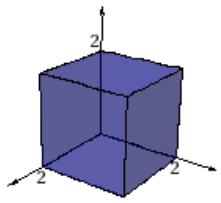
8.

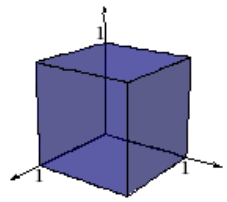
Exercício 8.1

a)



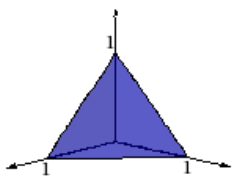
$$24$$

b)



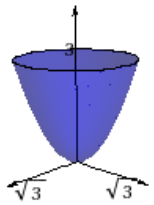
$$\frac{1}{2}\,(-1+e)^2$$

c)



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

d)



0

Exercício 8.2

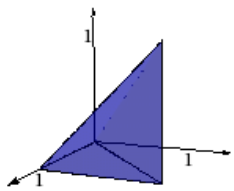
$$\int_{-\sqrt{a}}^{\sqrt{a}} \int_{-\sqrt{a-x^2}}^{\sqrt{a-x^2}} \int_{0}^{a-x^2-y^2} dz\,dy\,dx = \frac{a^2\,\pi}{2}$$

Exercício 8.3

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

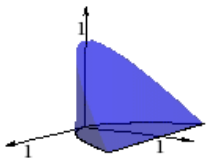
Exercício 8.4

a)



$$\int_{0}^{1} \int_{z}^{1} \int_{y}^{1} f[x, y, z]\,dx\,dy\,dz$$

b)



$$\int_{0}^{1} \int_{0}^{1-z} \int_{-\sqrt{y}}^{\sqrt{y}} f[x, y, x]\,dx\,dy\,dz$$

Exercício 8.5

1

Exercício 8.6

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

Exercício 8.7

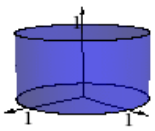
a)

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

b)

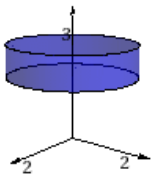
$$\left(\text{Cos}[1] - \text{Cos}\left[\frac{4+\pi}{4}\right]\right) \text{Log}[2]\ \text{Sin}[1]$$

Exercício 8.8



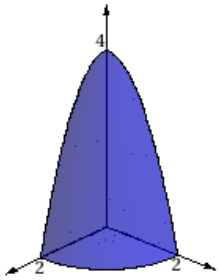
$$\int_0^1 \int_0^{2\pi} \int_0^1 z\,\rho^3\,dz\,d\theta\,d\rho = \frac{\pi}{4}$$

Exercício 8.9



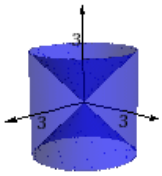
$$\int_0^2 \int_0^{2\pi} \int_2^3 z\,\rho\,\text{Exp}\left[\rho^2\right] dz\,d\theta\,d\rho = \frac{5}{2}\left(-1+e^4\right)\pi$$

Exercício 8.10



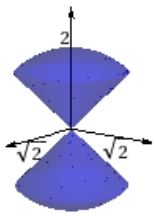
$$\int_0^{\frac{\pi}{2}} \int_0^2 \int_0^{4-\rho^2} \left(\rho^2 \operatorname{Cos}[\theta] + \rho^2 \operatorname{Sin}[\theta]\right) \mathrm{d}z \, \mathrm{d}\rho \, \mathrm{d}\theta = \frac{128}{15}$$

Exercício 8.11



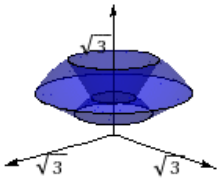
$$\int_0^{2\pi} \int_0^3 \int_{-\rho}^{\rho} \rho \, \mathrm{d}z \, \mathrm{d}\rho \, \mathrm{d}\theta = 36\,\pi$$

Exercício 8.12



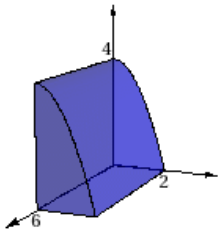
$$\int_0^{\frac{\pi}{4}} \int_0^2 \int_0^{2\pi} r^2 \operatorname{Sin}[\phi] \mathrm{d}\theta \mathrm{d}r \mathrm{d}\phi + \int_{\frac{3\pi}{4}}^{\pi} \int_0^2 \int_0^{2\pi} r^2 \operatorname{Sin}[\phi] \mathrm{d}\theta \mathrm{d}r \mathrm{d}\phi = 2 \int_0^{\frac{\pi}{4}} \int_0^2 \int_0^{2\pi} r^2 \operatorname{Sin}[\phi] \mathrm{d}\theta \mathrm{d}r \mathrm{d}\phi = -\frac{16}{3} \left(-2 + \sqrt{2}\right) \pi$$

Exercício 8.13



$$\int_1^2 \int_0^{2\pi} \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \text{Exp}\left[r^3\right] r^2 \, \text{Sin}[\phi] \, d\phi \, d\theta \, dr = \frac{1}{3} \left(-1+\sqrt{3}\right) e \left(-1+e^7\right) \pi$$

Exercício 8.14



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

Exercício 8.15

a)

$$\int_0^{2\pi} \int_0^{\pi} \int_{\sqrt{3}}^3 r^2 \, \text{Sin}[\phi] \, dr \, d\phi \, d\theta = -4 \left(-9+\sqrt{3}\right) \pi$$

b)

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

c)

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

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)

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

Exercício 8.16

$$2\int_0^{2\pi}\int_0^{\pi}\int_0^{R}\sqrt{R^2-r^2}\;r^2\,\mathrm{Sin}[\phi]\,dr\,d\phi\,d\theta=\frac{\pi^2\,R^4}{2}$$

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