MAT2219 – Cálculo Diferencial e Integral III
Respostas da lista 3

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Primeira parte

1.

   a. 8

   b. 4

   c. 4

   d. 3

   e. 4/3

   f. 4/3

   g. 2/3

   h. 16/3

   i. 7/12

   j. $\pi/3$

2. Volume=8π; centrode: $\bar{x}=0$, $\bar{y}=0$, $\bar{z}=\frac{1}{8\pi}\int z\pi(4-z)dz=4/3$.

3.

   a. $4\pi/2+\frac{2\pi}{3}(5\sqrt{4}-7)$

   b. 32/9

4. Volume do elipsoide=$\frac{4\pi}{3}\frac{32}{3}$. Hipervolume=$\int_0^1\int_0^{1-x}\int_0^{1-x-y}\int_0^{1-x-y-z} dwdzdydx$.

5. $\frac{\partial I}{\partial x}=\int_0^z\int_0^y f\,dy\,dz$, $\frac{\partial I}{\partial y}=\int_0^z\int_0^x f dxdz$, $\frac{\partial^2 I}{\partial y\partial z}=\int_0^x f\,dy$.

6.

   a. 16/3

   b. 8/3

   c. 16/3

7:

   a. $(r,\theta,z)=(D,0,0)$; $(\rho,\phi,\theta)=(D,\pi/2,0)$.

   b. $(r,\theta,z)=(D,3\pi/2,0)$; $(\rho,\phi,\theta)=(D,\pi/2,3\pi/2)$.

c. $(r, \theta, z) = (5, tan^{-1}(4/3), 5)$; $(\rho, \phi, \theta) = (5\sqrt{2}, tan^{-1}(5/5), tan^{-1}(4/3))$.

8: Use as frmulas $(x, y, z) = (\rho \sin\phi \cos\theta, \rho \sin\phi \sin\theta, \rho \cos\phi)$; $(r, \theta, z) = (\rho \sin\phi, \theta, \rho \cos\phi)$.

9: $\phi = tan^{-1}(r/z)$.

10:

a. $\frac{2\pi}{3}(1 - 1/\sqrt{2})$.

b. $3\pi/4$.

c. $7\pi/3$.

d. $\pi^4/2$

e. $\pi/6$

f. $5\pi/3$

g. $\pi^2/8$

h. $\frac{2\pi}{3}(26 - 13\sqrt{2})$

i. $2\pi^4/3$

j. $(1 - cos(1))/3$

11. "Coração" revolvido ao redor do eixo z.

12. $\frac{2\pi}{3}r^2(2r + 3)$

14: r

Segunda parte

1.

a. $ln(\sqrt{2}) - 5/16$

b. $1/48$

2.

a. $\int_0^1 \int_{-z}^{z} \int_{-\sqrt{z^2-x^2}}^{\sqrt{z^2-x^2}} f(x, y, z)dy\, dx\, dz$.

b. $\int_0^1 \int_0^{x^2} \int_0^1 f(x, y, z)dydzdx + \int_0^1 \int_{x^2}^{x^2+1} \int_{\sqrt{z-x^2}}^1 f(x, y, z)dydzdx$

3.

a. $\frac{4\pi}{3}a^3$

b. $\frac{4\pi}{3}(b^3 - a^3)$

c. $\frac{4\pi}{3}R^3(a^2 + b^2 + c^2)^{-1/2}$.