

MAT216 – Cálculo Diferencial e Integral III
Respostas da Lista de Exercícios 6

1. (a) -4 (b) 4 (c) 8 (d) 4π (e) $3\pi/2$
2. 0
3. 0
4. (a) $\int_0^{2\pi} \int_0^a f(r \cos \theta, r \sin \theta) r \, dr d\theta$ (b) $\int_{-\pi/2}^{\pi/2} \int_0^{2 \cos \theta} f(r \cos \theta, r \sin \theta) r \, dr d\theta$
(c) $\int_0^{2\pi} \int_a^b f(r \cos \theta, r \sin \theta) r \, dr d\theta$ (d) $\int_0^{\pi/2} \int_0^{1/(\sin \theta + \cos \theta)} f(r \cos \theta, r \sin \theta) r \, dr d\theta$
(e) $\int_0^{\pi/4} \int_0^{\tan \theta \sec \theta} f(r \cos \theta, r \sin \theta) r \, dr d\theta + \int_{\pi/4}^{3\pi/4} \int_0^{\csc \theta} f(r \cos \theta, r \sin \theta) r \, dr d\theta$
 $+ \int_{3\pi/4}^{\pi} \int_0^{\tan \theta \sec \theta} f(r \cos \theta, r \sin \theta) r \, dr d\theta$
5. (a) $\frac{2}{4} \pi a^4$ (b) $\frac{1}{6} a^3 [\sqrt{2} + \ln(1 + \sqrt{2})]$ (c) $\sqrt{2} - 1$ (d) $\pi a^4/8$
6. $\pi^4/3$
7. (a) $1 + 2u$ (c) $14/3$ (d) $2 + \frac{2}{\sqrt{3}} \left(\arctan \frac{1}{\sqrt{3}} - \arctan \frac{5}{\sqrt{3}} \right)$
8. (a) $4(u^2 + v^2)$ (c) 0
10. (a) $\ln \sqrt{2} - 5/16$ (b) $1/48$ (c) $\frac{4}{5} \pi abc$ (d) $\pi/6$
11. (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) $\int_0^1 \int_0^{x^2} \int_0^1 f(x, y, z) \, dy dz dx + \int_0^1 \int_{x^2}^1 \int_{\sqrt{z-x^2}}^1 f(x, y, z) \, dy dz dx$
12. (a) $16\pi/3$ (b) $1/6$
13. (a) $\frac{4}{3} \pi a^3$ (b) $\frac{4}{3} \pi (b^3 - a^3)$ (c) $\frac{4}{3} \pi R^3 (a^2 + b^2 + c^2)^{-1/2}$
14. (a) $\frac{2}{3} \pi (5\sqrt{5} - 4)$ (b) $32/9$
16. No eixo, à distância de $\frac{2}{5}h$ da base.