

Cálculo Diferencial e Integral II Respostas à Ficha de Trabalho 6

1. (a) $\frac{2}{3}$.
 (b) $2 - \sin(2)$.
2. (a) $\frac{1}{6}(e^9 - 1)$.
 (b) $\frac{1}{6}$.
3. (a) $\int_{-1}^0 \left(\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x, y) dx \right) dy + \int_0^1 \left(\int_{-\sqrt{1-y}}^{\sqrt{1-y}} f(x, y) dx \right) dy$.
 (b) $\int_0^1 \left(\int_{2-y}^{1+\sqrt{1-y^2}} f(x, y) dx \right) dy$.
 (c) $\int_{-1}^0 \left(\int_0^{\pi - \arcsin x} f(x, y) dy \right) dx + \int_{2\pi + \arcsin x}^{2\pi} f(x, y) dy \int_{-1}^0 \left(\int_{\arcsin x}^{\pi - \arcsin x} f(x, y) dy \right) dx$.
4. A área é $\frac{7}{6}$. O centro de massa é o ponto $(\frac{5}{14}, \frac{38}{35})$. Os momentos de inércia são $I_x = \frac{673}{420}$, $I_y = \frac{13}{60}$ e $I_O = I_x + I_y = \frac{191}{105}$.
5. (a) $\int_0^1 \left(\int_0^x \left(\int_0^{1-x} dy \right) dz + \int_x^1 \left(\int_{z-x}^{1-x} dy \right) dz \right) dx$, e
 $\int_0^1 \left(\int_0^z \left(\int_{z-y}^{1-y} dx \right) dy + \int_z^1 \left(\int_0^{1-y} dx \right) dy \right) dz$.
 (b) $\int_{-1}^1 \left(\int_{-\sqrt{1-z^2}}^{\sqrt{1-z^2}} \left(\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy \right) dx \right) dz$ e $\int_{-1}^1 \left(\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \left(\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dz \right) dy \right) dx$.
 (c) $\int_{-1}^0 \left(\int_{-1}^{-\sqrt{\frac{1-z}{2}}} \left(\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} dx \right) dy + \int_{-\sqrt{\frac{1-z}{2}}}^{-\sqrt{\frac{z}{2}}} \left(\int_{-\sqrt{y^2+z}}^{\sqrt{y^2+z}} dx \right) dy + \right.$
 $\left. + \int_{\sqrt{\frac{1-z}{2}}}^{\sqrt{\frac{1-z}{2}}} \left(\int_{-\sqrt{y^2+z}}^{\sqrt{y^2+z}} dx \right) dy + \int_{\sqrt{\frac{1-z}{2}}}^1 \left(\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} dx \right) dy \right) dz +$
 $\left. + \int_0^1 \left(\int_{-1}^{-\sqrt{\frac{1-z}{2}}} \left(\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} dx \right) dy + \int_{-\sqrt{\frac{1-z}{2}}}^{-\sqrt{\frac{z}{2}}} \left(\int_{-\sqrt{y^2+z}}^{\sqrt{y^2+z}} dx \right) dy + \right.$
 $\left. + \int_{\sqrt{\frac{1-z}{2}}}^1 \left(\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} dx \right) dy \right) dz$, e
 $\int_{-1}^1 \left(\int_{2x^2-1}^{x^2} \left(\int_{-\sqrt{1-x^2}}^{-\sqrt{x^2-z}} dy + \int_{\sqrt{x^2-z}}^{\sqrt{1-x^2}} dy \right) dz + \int_{x^2}^1 \left(\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy \right) dz \right) dx$.
 (d) $\int_0^1 \left(\int_{\frac{x}{2}}^x \left(\int_0^x dz \right) dy \right) dx$, $\int_0^{\frac{1}{2}} \left(\int_y^{2y} \left(\int_0^x dz \right) dx \right) dy + \int_{\frac{1}{2}}^1 \left(\int_y^1 \left(\int_0^x dz \right) dx \right) dy$, e
 $\int_0^{\frac{1}{2}} \left(\int_{\frac{z}{2}}^z \left(\int_z^{2y} dx \right) dy + \int_{\frac{z}{2}}^{\frac{1}{2}} \left(\int_y^{2y} dx \right) dy + \int_{\frac{1}{2}}^1 \left(\int_y^1 dx \right) dy \right) dz +$
 $\int_{\frac{1}{2}}^1 \left(\int_{\frac{z}{2}}^{\frac{1}{2}} \left(\int_z^{2y} dx \right) dy + \int_{\frac{1}{2}}^z \left(\int_z^1 dx \right) dy + \int_z^1 \left(\int_y^1 dx \right) dy \right) dz$.
6. $\frac{1}{6}$.
7. (a) $\ln \sqrt{2} - \frac{5}{16}$.
 (b) $\frac{7}{48}$.
8. O volume é $\frac{80}{3}$. O centróide é o ponto $(\frac{121}{50}, 0, \frac{182}{75})$.