练习题 A 答案

1. $I_3 \le I_1 \le I_2$

2. $I_1 = 2I_2$

3. ①$0 \le I \le 6$；②$6\pi \le I \le 24\pi$；　③$\pi \le I \le e\pi$；　④$0 \le I \le \pi^2$.

4. 0

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

　③$\int_0^1 dy \int_{e^y}^e f(x,y)dx$　　④$\int_0^2 dx \int_{\frac{x}{2}}^{3-x} f(x,y)dy$

6. $127324m^3$

7. ①$I = \int_{-1}^0 dx \int_{-x-1}^{x+1} f(x,y)dy + \int_{01}^1 dx \int_{x-1}^{1-x} f(x,y)dy$；

　②$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} d\theta \int_0^{2\cos\theta} f(\rho\cos\theta, \rho\sin\theta)\rho d\rho$；

　③$I = \int_1^2 dx \int_{\frac{1}{x}}^x f(x,y)dy$（或$I = \int_{\frac{1}{2}}^1 dy \int_{\frac{1}{y}}^2 f(x,y)dx + \int_1^2 dy \int_y^2 f(x,y)dx$）

　④

　⑤$\int_0^{2\pi} d\theta \int_\pi^{\sqrt{2}\pi} f(\rho\cos\theta, \rho\sin\theta)\rho d\rho$

　⑥$I = \int_{-1}^2 dx \int_{x^2}^{x+2} f(x,y)dy$

　⑦$I = \int_1^e dy \int_{-\ln y}^{\ln y} f(x,y)dx$

8. ①$\pi(e^4 - 1)$；　②$-\frac{3}{4}\pi^2$；　③$\frac{\pi}{8}a^3$

9. ①$\frac{2}{3}\pi(b^3 - a^3)$；　②$\frac{9}{4}$；　③$80\pi$；

10. ①$8\pi$；　②$6\pi$；

练习题 B 答案：

1. ①C；　②A

2. （题目不全，不做）

3. ①$\frac{\pi}{4}R^4 + 4\pi R^2$；　②$\frac{16}{\pi^3}$；　③$\frac{\pi}{8}(e^2 - 1)$；　④$\frac{1}{4}(e-1)^2$

4. ①$\int_0^1 dy \int_0^{y^2} f(x,y)dx + \int_1^2 dy \int_0^{\sqrt{2y-y^2}} f(x,y)dx$；

② $\int_{-1}^{0}dy\int_{\pi-\arcsin y}^{2\pi+\arcsin y}f(x,y)dx+\int_{0}^{1}dy\int_{\arcsin y}^{\pi-\arcsin y}f(x,y)dx$

③ $\int_{0}^{1}dy\int_{0}^{\sqrt[3]{y}}f(x,y)dx+\int_{1}^{\sqrt{2}}dy\int_{0}^{2-y^2}f(x,y)dx$

5. ① $\int_{0}^{\frac{\pi}{6}}d\theta\int_{0}^{\sqrt{3}\cos\theta}f(\rho\cos\theta,\rho\sin\theta)\rho d\rho+\int_{\frac{\pi}{6}}^{\frac{\pi}{2}}d\theta\int_{0}^{\frac{1}{\sin\theta}}f(\rho\cos\theta,\rho\sin\theta)\rho d\rho$；

② $\int_{0}^{\frac{\pi}{2}}d\theta\int_{(\cos\theta-\sin\theta)^{-1}}^{1}f(\rho\cos\theta,\rho\sin\theta)\rho d\rho$； ③ $\int_{0}^{\frac{\pi}{2}}d\theta\int_{0}^{a}f(\rho\cos\theta,\rho\sin\theta)\rho d\rho$；

④ $\int_{\arctan\frac{1}{2}}^{\frac{\pi}{4}}d\theta\int_{0}^{\frac{1}{\cos\theta}}f(\rho\cos\theta,\rho\sin\theta)\rho d\rho$

6. $-\frac{2}{5}$

7. $\frac{\pi}{4}-\frac{1}{3}$

8.

9.

10. $xy+\frac{1}{8}$