

作业十一

Noflowerzzk

2025.5.7

P133 T1

(3) 原式为

$$\int_{-\frac{\pi}{4}}^{\frac{3\pi}{4}} (\sin \theta + \cos \theta) d\theta = \frac{\pi}{2}$$

(4) 原式为

$$\int_0^{\frac{\pi}{2}} d\theta \int_0^1 \sqrt{\frac{1-r^2}{1+r^2}} r dr = \frac{\pi^2}{8} - \frac{\pi}{4}$$

P233 T3

$$\iint f(x, y) dx dy = f(\xi, \eta) \pi \rho^2$$

且当 $\rho \rightarrow 0$ 是 $(\xi, \eta) \rightarrow 0$. 故原式的极限为 0.

P233 T4

(4) $u = x + y, v = \frac{x-y}{x+y}$, 则原式为 $e - \frac{1}{e}$.

(5) $u = x + y, v = x - y$, 代入又原式为 $\frac{\pi}{6}$

(6) 令 $x = r \cos \theta, y = r \sin \theta$, 有原式为 $\frac{\pi^2 - 8}{16} a^2$

P233 T5

(5) 结果为 $\frac{108\sqrt{3} - 98}{30} \pi a^2$

(6) $\frac{1024}{3} \pi a^5$

(7) $\frac{4}{3} \pi$

(8) $\frac{1}{32}$

P233 T9

$$8\pi$$

P233 T10

升高 12cm

P233 T11

$$F = -2\frac{GM}{a^2} \left(1 - \frac{c}{\sqrt{a^2 + c^2}} \right)$$

P233 T12

坐标为 $\left(0, 0, \frac{5}{4}R\right)$

P233 T13

$$\begin{aligned} \text{原式} &\leq \iint_{x^2+y^2 \leq 1} \frac{1}{4} dx dy = \frac{\pi}{4} \\ \text{原式} &\geq \iint_{x^2+y^2 \leq 1} \frac{dx dy}{\sqrt{16+x^2+y^2}} = 2\pi (\sqrt{17} - 4) \end{aligned}$$

P233 T15

$$\begin{aligned} \iiint_{\Omega} f(z) dx dy dz &= \int_{-1}^1 f(z) dz \iint_{\Omega'} dx dy \\ &= \pi \int_{-1}^1 f(z) (1 - z^2) dz \end{aligned}$$

摘要