8. $\dfrac{\pi^2 abc}{4}$.

9. $\dfrac{3}{2}$.

10. $\dfrac{8\pi}{5}$.

11. 提示:用反证法及积分中值定理.

(B)

1. (1) πa^3; (2) $\dfrac{\pi}{6}$; (3) $\dfrac{2}{3}\pi(5\sqrt{5}-4)$.

2. (1) $\dfrac{3}{35}$; (2) $\dfrac{abc}{3}$.

3. (1) $\dfrac{\pi^2 a^3}{4\sqrt{2}}$; (2) $\dfrac{1}{2}$.

习题 10.5 答案与提示

(A)

1. (1) $\dfrac{7}{2}$; (2) $\dfrac{88}{105}$.   **2.** (1) $\dfrac{7}{3}\ln 2$; (2) $\dfrac{2\pi}{3}(b^3-a^3)$.

3. (1) $\bar{x}=\dfrac{3}{5}x_0$, $\bar{y}=\dfrac{3}{8}y_0$; (2) $\bar{x}=0$, $\bar{y}=\dfrac{4b}{3\pi}$; (3) $\bar{x}=\dfrac{35}{48}$, $\bar{y}=\dfrac{35}{54}$.

4. (1) $\left(0,0,\dfrac{3}{4}\right)$; (2) $\left(0,0,\dfrac{3(A^4-a^4)}{8(A^3-a^3)}\right)$; (3) $\left(\dfrac{2}{5}a,\dfrac{2}{5}a,\dfrac{7}{30}a^2\right)$.

5. (1) $I_y=\dfrac{1}{4}\pi a^3 b$; (2) $I_x=\dfrac{1}{3}ab^3$, $I_y=\dfrac{1}{3}a^3 b$.

6. $I_l=\dfrac{1}{2}\rho_0\pi a^2$ (ρ_0 为薄片密度).

7. $I_x=\dfrac{2}{3}\rho_0 a^5$ (ρ_0 为立方体密度).

8. $\dfrac{1}{2}a^2 M$ ($M=\pi a^2 h\rho_0$ 为圆柱体的质量).

(B)

1. $F_z=2k\rho_0\pi c\left(\dfrac{1}{c}-\dfrac{1}{\sqrt{R^2+c^2}}\right)$ (ρ_0 为均匀薄片密度).

2. $F_x=0$, $F_y=0$, $F_z=2\left(1-\dfrac{1}{\sqrt{2}}\right)G\pi$ (G 为引力常数).

3. 设均匀球体的密度为 ρ_0, 则 $\rho_0=\dfrac{3M}{4\pi R^3}$(这里只考虑 $a\geqslant 0$ 的情况,对于 $a<0$ 的情况可同样考

虑).当 $a\geqslant R$ 时,$Z=-\dfrac{kMm}{a^2}$;当 $0\leqslant a<R$ 时,$Z=-\dfrac{kMm}{R^3}a$.

总习题 10 答案与提示

1. (1)(A); (2)(C); (3)(B).

2.(1) $\frac{1}{2}(e-1)$；　(2) $\frac{1-\cos 81}{4}$；　(3) $\frac{2}{3}\sqrt{3}-\frac{4}{9}\sqrt{2}$；　(4) $1-\sin 1$.

3. $\frac{11}{15}$.

4. $\frac{a^2}{2}$.

5. $\pi-\frac{40}{9}$.

6. $\frac{1}{6}[\sqrt{2}+\ln(1+\sqrt{2})]$.

7. $\frac{ab^2}{30}$.

8. $\frac{3\pi}{2}$.

9. $\frac{1}{3}(b-a)\ln\frac{q}{p}$.

10. 略.

11. 略.

12. $\frac{250\pi}{3}$.

13. $\int_0^{\pi}\mathrm{d}\theta\int_0^{\sin\theta}r\mathrm{d}r\int_0^{\sqrt{3}r}f(\sqrt{r^2+z^2})\mathrm{d}z,\int_0^{\pi}\mathrm{d}\theta\int_{\pi/3}^{\pi/2}\sin\varphi\mathrm{d}\varphi\int_0^{\frac{\sin\theta}{\sin\varphi}}r^2 f(r)\mathrm{d}r$.

14. $\frac{\sqrt{2}}{2}a$.

15. $\frac{365}{105}\rho$.

习题 11.1 答案与提示

1.(1) $1+\ln 2-\ln(1+e)$；　(2) $\frac{\pi}{4}$；　(3) 8/3.

2.(1) $\frac{\pi}{8}\ln 2$,提示:利用 $\int_0^1\frac{\ln(1+\alpha x)}{1+x^2}\mathrm{d}x$ 对 α 求导；　(2) $\frac{1}{2}\ln\frac{1+(b+1)^2}{1+(a+1)^2}$.

3.(1) $I'(y)=2ye^{-y^5}-e^{-y^2}-\int_y^{y^2}x^2e^{-x^2y}\mathrm{d}x$；

(2) $\left(\frac{1}{y}+\frac{1}{b+y}\right)\sin y(b+y)-\left(\frac{1}{y}+\frac{1}{a+y}\right)\sin y(a+y)$；　(3) $3f(x)+2xf'(x)$.

4.(1) $\pi\ln\frac{a+b}{2}$；　(2) $\pi\cdot\arcsin a$.

习题 11.2 答案与提示

1.(1)一致收敛；　(2)一致收敛；　(3)一致收敛；　(4)非一致收敛.

2.略.