

习题 3.2

1. π . 2. (1) 12; (2) 12.

3. (1) $\frac{\pi a^2}{4}$; (2) $\frac{4\pi}{3} + 2\sqrt{3}$. 5. $\int_2^1 (1+x) dx > \int_2^1 e^x dx > \int_2^1 e^{x^2} dx$.

7. $-2 \leq I \leq 2$. 8. $\frac{2\sin x^2}{x}$. 9. $-3x^2 \sin^3 x^3$.

10. $-\left[\cos(\pi \sin^2 x)\right] \cdot \cos x - \left[\cos(\pi \cos^2 x)\right] \cdot \sin x$.

11. (1) 2; (2) $\ln 2 - \frac{5}{6}$; (3) $1 - \frac{1}{e^\pi}$. 12. (1) 8; (2) $\frac{\pi^2}{8} + 1$; (3) $\frac{7}{3\ln 2} - \frac{1}{9}$.

13. $4 - \pi$. 14. $\frac{17}{6}$. 15. $F(x) = \begin{cases} x^3, & 0 \leq x < 1 \\ -3 + 5x - x^2, & 1 \leq x \leq 2 \end{cases}$.

16. $\Phi(x) = \begin{cases} 1 - \cos x, & 0 \leq x \leq \frac{\pi}{2} \\ 1 + x - \frac{\pi}{2}, & \frac{\pi}{2} < x \leq \pi \end{cases}$, 且 $\Phi(x)$ 在区间 $[0, \pi]$ 上处处连续.

17. (1) $\frac{1}{4}\pi a^2$; (2) $\frac{1}{6}$; (3) $\frac{4}{5}$; (4) $\frac{22}{3}$. 18. (1) $\frac{\pi}{12} + \frac{\sqrt{3}}{2} - 1$; (2) 2.

19. $\frac{\pi}{2}a^3$. 20. $\frac{\pi}{4}$. 21. $4 - \pi$. 22. $xf(x^2)$.

23. $\frac{\sqrt{3}}{2} - \frac{\pi}{6}$. 24. $\frac{1}{2}\ln 2 - \frac{1}{4}\ln 3$. 25. $\frac{1}{2}(e^{\frac{\pi}{2}} + 1)$. 26. $\frac{\pi}{8}$. 27. -5 .

28. $\begin{cases} \frac{xf(x) - \int_0^x f(u) du}{x^2}, & x \neq 0 \\ \frac{A}{2}, & x = 0 \end{cases}$. 29. (1) π ; (2) $\frac{\ln 3}{2}$.

30. (1) $1 - \frac{\sqrt{3}}{2}$; (2) $\frac{\sqrt{2}}{2} \left(\pi + \arctan \frac{1}{2} \right)$.

31. $(-1)^n n!$.

32. (1) 发散; (2) 1; (3) $\frac{1}{2}$; (4) 1; (5) 2; (6) 发散; (7) $\frac{\pi}{2}$; (8) $\frac{\pi}{2}$.