練習 **7.8**

I. Explain why each of the following integrals is improper.

(a) $\int_{1}^{\infty} x^4 e^{-x^4}\, dx$ (b) $\int_{0}^{\pi/2} \sec x\, dx$

(c) $\int_{0}^{2} \dfrac{x}{x^2 - 5x + 6}\, dx$ (d) $\int_{-\infty}^{0} \dfrac{1}{x^2 + 5}\, dx$

5–40 Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

5. $\int_{1}^{\infty} \dfrac{1}{(3x + 1)^2}\, dx$ **9.** $\int_{4}^{\infty} e^{-y/2}\, dy$ **11.** $\int_{-\infty}^{\infty} \dfrac{x}{1 + x^2}\, dx$

15. $\int_{2\pi}^{\infty} \sin \theta\, d\theta$ **23.** $\int_{-\infty}^{\infty} \dfrac{x^2}{9 + x^6}\, dx$ **27.** $\int_{0}^{1} \dfrac{3}{x^5}\, dx$

35. $\int_{0}^{3} \dfrac{dx}{x^2 - 6x + 5}$

49–54 Use the Comparison Theorem to determine whether the integral is convergent or divergent.

49. $\int_{0}^{\infty} \dfrac{x}{x^3 + 1}\, dx$ **53.** $\int_{0}^{1} \dfrac{\sec^2 x}{x\sqrt{x}}\, dx$

7.8 答案

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Abbreviations: C, convergent; D, divergent

1. (a) Infinite interval   (b) Infinite discontinuity
(c) Infinite discontinuity   (d) Infinite interval
5. $\frac{1}{12}$ **9.** $2e^{-2}$ **11.** D   **15.** D   **23.** $\pi/9$ **27.** D
35. D   **49.** C   **53.** D