練習 **7.4**

1–6 Write out the form of the partial fraction decomposition of the function (as in Example 7). Do not determine the numerical values of the coefficients.

5. (a) $\dfrac{x^4}{x^4 - 1}$

(b) $\dfrac{t^4 + t^2 + 1}{(t^2 + 1)(t^2 + 4)^2}$

7–38 Evaluate the integral.

9. $\displaystyle\int \frac{x - 9}{(x + 5)(x - 2)}\, dx$

15. $\displaystyle\int_3^4 \frac{x^3 - 2x^2 - 4}{x^3 - 2x^2}\, dx$

19. $\displaystyle\int \frac{1}{(x + 5)^2(x - 1)}\, dx$

21. $\displaystyle\int \frac{x^3 + 4}{x^2 + 4}\, dx$

23. $\displaystyle\int \frac{5x^2 + 3x - 2}{x^3 + 2x^2}\, dx$

35. $\displaystyle\int \frac{dx}{x(x^2 + 4)^2}$

37. $\displaystyle\int \frac{x^2 - 3x + 7}{(x^2 - 4x + 6)^2}\, dx$

39–50 Make a substitution to express the integrand as a rational function and then evaluate the integral.

41. $\displaystyle\int_9^{16} \frac{\sqrt{x}}{x - 4}\, dx$

49. $\displaystyle\int \frac{\sec^2 t}{\tan^2 t + 3 \tan t + 2}\, dt$

7.4 答案

5. (a) $1 + \dfrac{A}{x - 1} + \dfrac{B}{x + 1} + \dfrac{Cx + D}{x^2 + 1}$

(b) $\dfrac{At + B}{t^2 + 1} + \dfrac{Ct + D}{t^2 + 4} + \dfrac{Et + F}{(t^2 + 4)^2}$

9. $2 \ln|x + 5| - \ln|x - 2| + C$

15. $\frac{7}{6} + \ln \frac{2}{3}$

19. $-\dfrac{1}{36} \ln|x + 5| + \dfrac{1}{6} \dfrac{1}{x + 5} + \dfrac{1}{36} \ln|x - 1| + C$

21. $\frac{1}{2}x^2 - 2 \ln(x^2 + 4) + 2 \tan^{-1}(x/2) + C$

23. $2 \ln|x| + (1/x) + 3 \ln|x + 2| + C$

35. $\frac{1}{16} \ln|x| - \frac{1}{32} \ln(x^2 + 4) + \dfrac{1}{8(x^2 + 4)} + C$

37. $\frac{7}{8}\sqrt{2} \tan^{-1}\left(\dfrac{x - 2}{\sqrt{2}}\right) + \dfrac{3x - 8}{4(x^2 - 4x + 6)} + C$

41. $2 + \ln \frac{25}{9}$

49. $\ln|\tan t + 1| - \ln|\tan t + 2| + C$