

Partial Fractions

1. Which of the following is easiest to integrate?

(a) $\int \frac{5x - 4}{x^2 - x - 2} dx.$

(b) $\int \frac{5x - 4}{(x - 2)(x + 1)} dx.$

(c) $\int \frac{5x}{x^2 - x - 2} dx - \int \frac{4}{x^2 - x - 2} dx.$

(d) $\int \frac{3}{x + 1} dx + \int \frac{2}{x - 2} dx$

How do the four choices relate to each other?

2. Evaluate the following integrals.

(a) $\int \frac{1}{y^2 - 4} dy.$

(b) $\int \frac{5x - 7}{x^2 - 3x + 2} dx.$

3. Write down the form of the partial fraction expansion for the following integrals. (You don't need to actually solve for the coefficients.)

(a) $\int \frac{3x^2 + x + 5}{(x + 1)(x + 3)(x - 5)}.$

(b) $\int \frac{x + 1}{(x^2 + 4)(x^2 + 9)}.$

(c) $\int \frac{x^3 + 2x}{(x + 4)(x + 3)(x + 2)^2}.$

(d) $\int \frac{x^2 + 1}{(x + 1)^2(x^2 + 5)}.$

(e) $\int \frac{3x^2}{x^2 + 2x + 1} dx.$

(f) $\int \frac{x^3 + 4x^2 + 7x}{x^2 + 4x + 3} dx.$

4. Evaluate the following integrals.

(a) $\int \frac{x^2 - x + 4}{x^3 + 4x}.$

(b) $\int \frac{1}{x^3 + x} dx.$

(c) $\int \frac{\sin \theta d\theta}{\cos^2 \theta + \cos \theta - 2}.$