

Partial Fractions (7.5)

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Partial Fraction Decomposition (for integrating rational functions):

- 1) If a rational function is improper, divide it out first.
- 2) Factor the denominator.
- 3) For each linear factor of the form $(px + q)$, include the fractions $\frac{A_1}{(px + q)} + \frac{A_2}{(px + q)^2} + \dots + \frac{A_m}{(px + q)^m}$ in the partial fraction decomposition.
- 4) Solve for A_1, A_2, \dots, A_m , by clearing fractions by multiplying by the least common denominator, then using convenient values of x to solve for A_1, A_2, \dots, A_m .

Ex. 1: Find $\int \frac{x+5}{x^2+4x+3} dx$

You Try: Find

$$\int \frac{1}{4x^2 - 9} dx$$

Ex. 2: Find $\int \frac{x^3 - x + 3}{x^2 + x - 2} dx$

You Try: Find $\int \frac{3x^3 - 25x^2 + 19x + 73}{x^2 - 9x + 14} dx$

Ex. 3: Find $\int \frac{4x^2}{x^3 + x^2 - x - 1} dx$

You Try: Find $\int \frac{4x^2 + 2x - 1}{x^3 + x^2} dx$