

Improper Integrals

Example

Compute $\int_1^{\infty} x^{-2} dx$

Example

Compute $\int_1^{\infty} x^{-1} dx$

Example

Compute $\int_0^{\infty} e^{-3x} dx$

Example

Compute $\int_0^5 \frac{1}{\sqrt[3]{x-3}} dx$

Example

Compute $\int_{-\infty}^{\infty} x dx$

Partial Fractions

Example

Write $\frac{1}{(x+5)(x+4)}$ as partial fractions

Example

Write $\frac{1}{(x+2)(x-1)^2}$ as partial fractions

Example

Write $\frac{3x^2 - 3x - 2}{(x - 1)(x - 2)}$ as partial fractions

Example

Write $\frac{x^2 + 5x + 7}{(x + 1)^3}$ as partial fractions

Example

Write $\frac{1}{x^2 - 2x - 1}$ as partial fractions

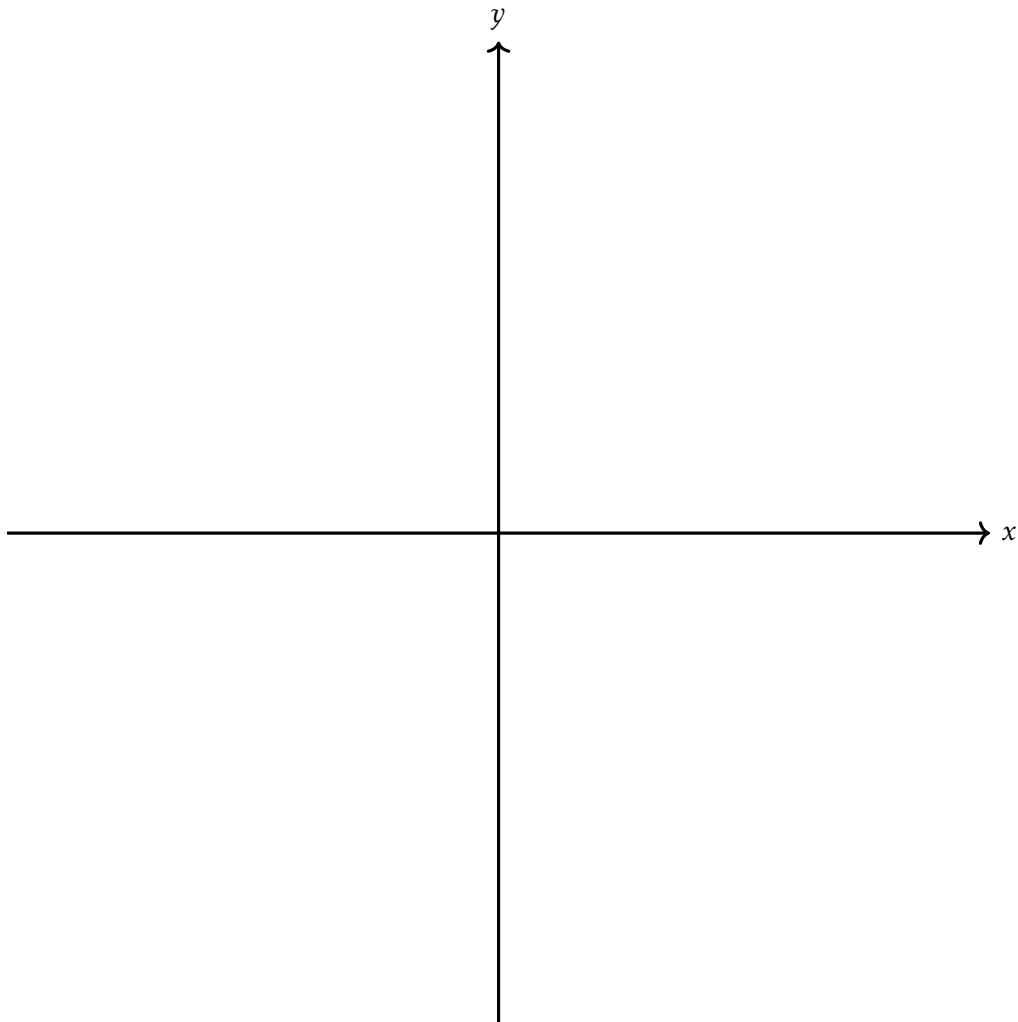
Example

Write $\frac{1}{x^3 - 1}$ as partial fractions

Graph Sketching of Rational Functions

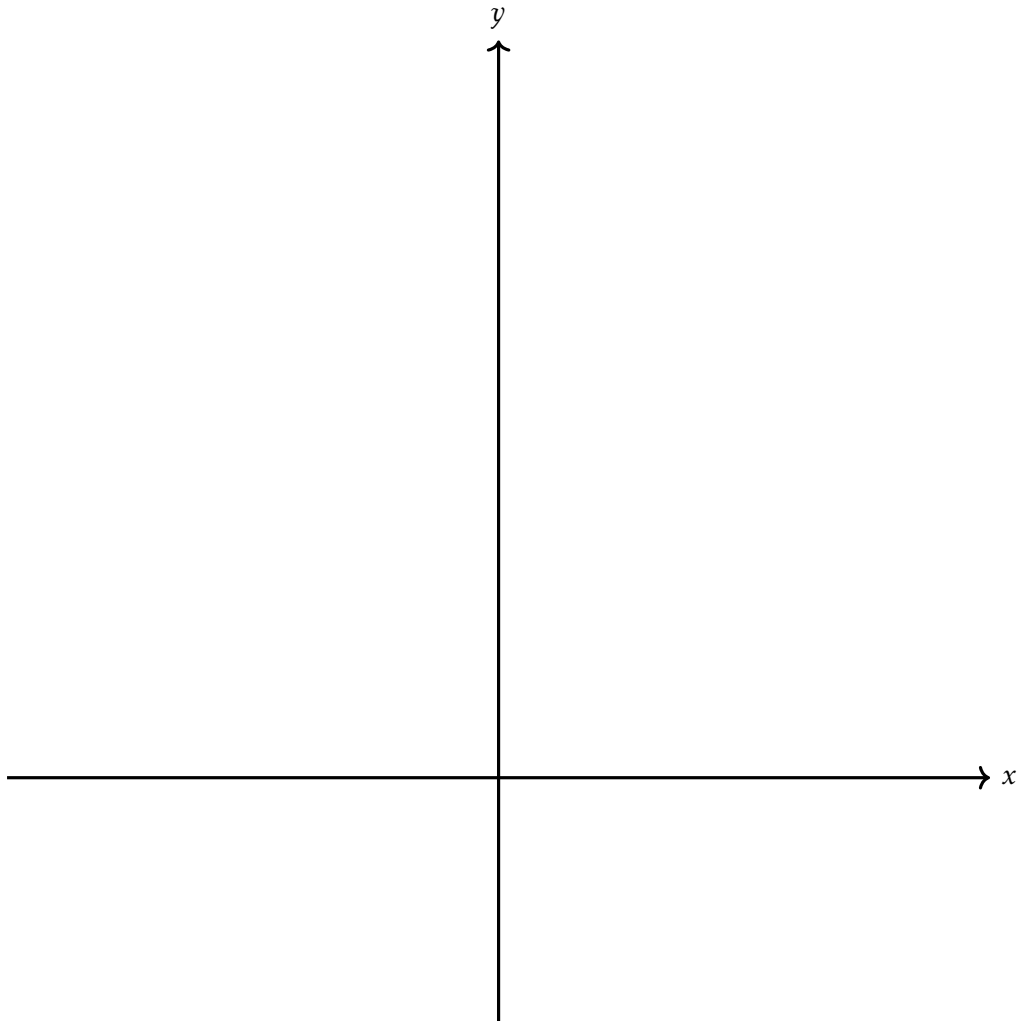
Example

Sketch $y = x + \frac{1}{x}$ and $y = x - \frac{1}{x}$



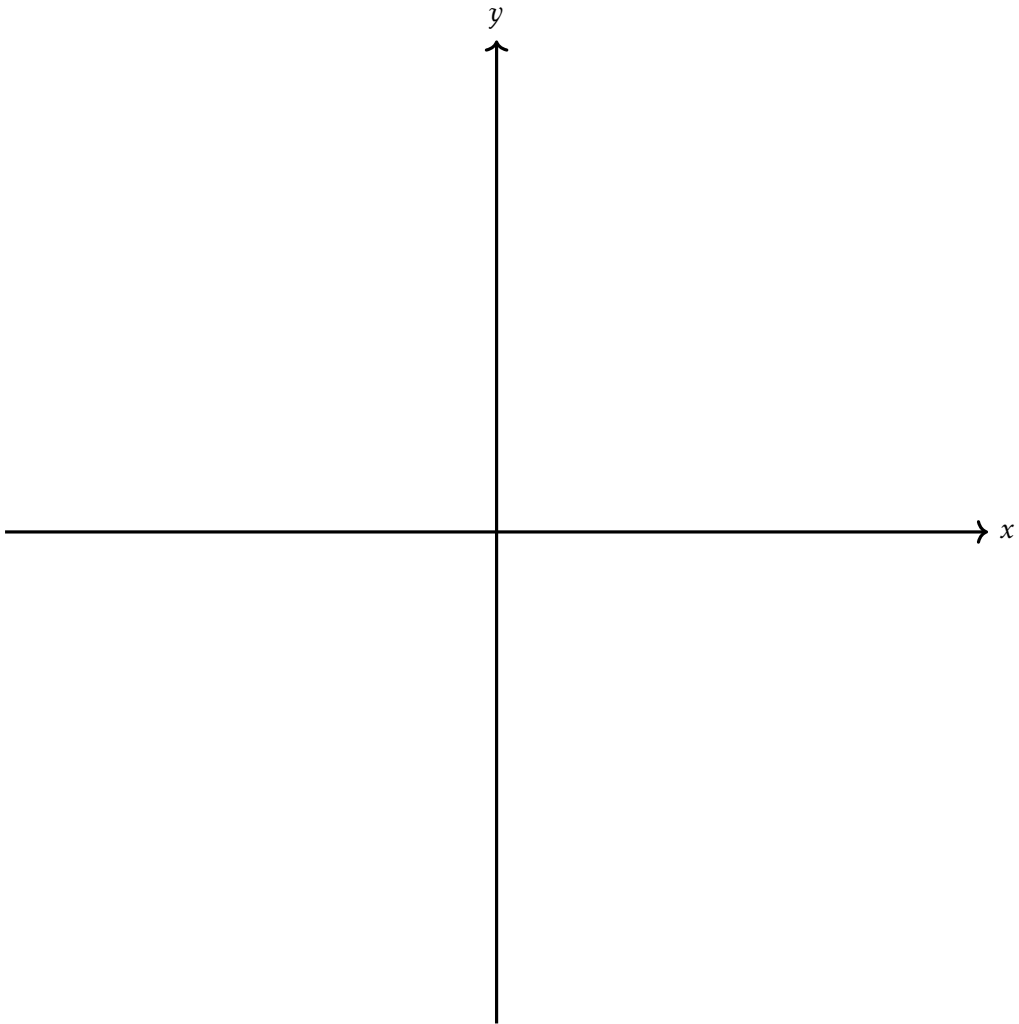
Example

Sketch $y = \frac{1}{1+x^2}$



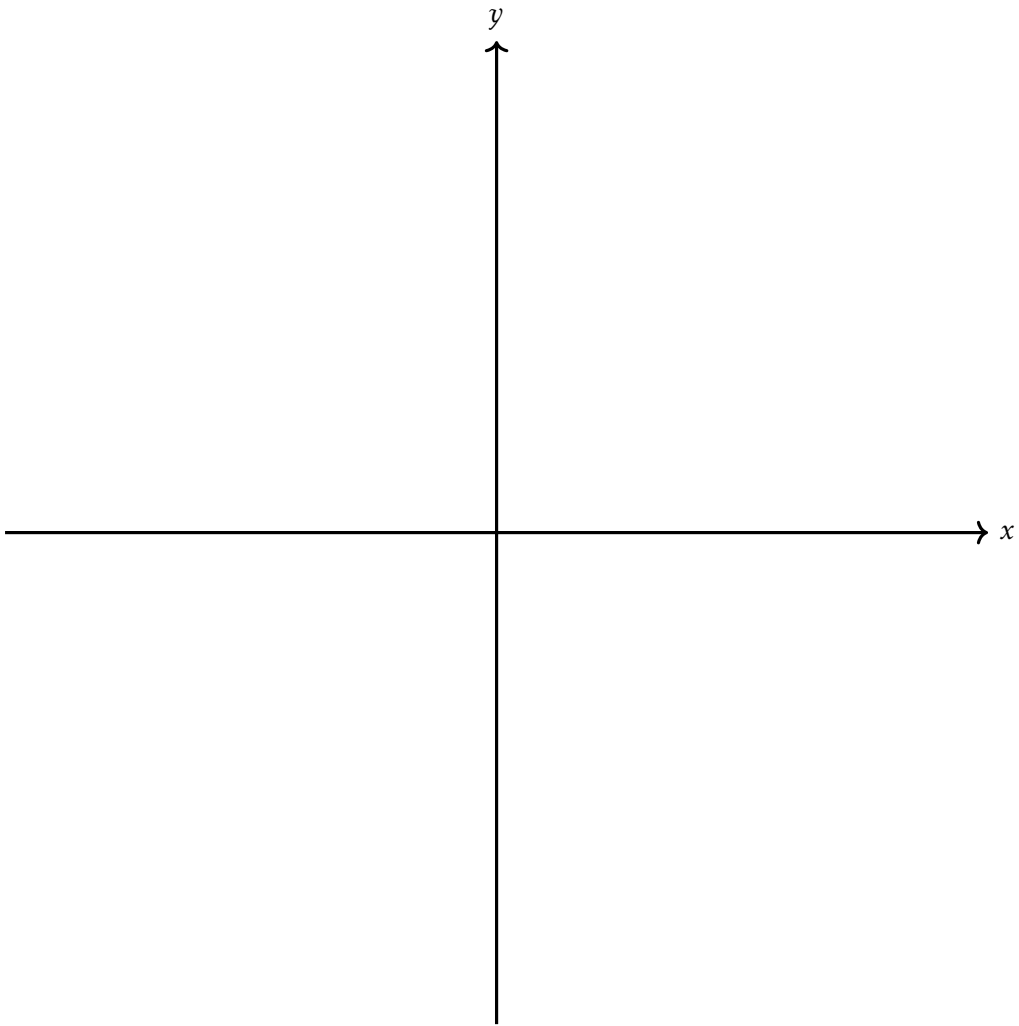
Example

Sketch $y = \frac{2x}{1+x^2}$



Example

Sketch $y = \frac{x^2 - 4x + 3}{x^2 - 6x + 10}$



Uses of Partial Fractions

Integration

Example

Integrate $\int_2^3 \frac{x+1}{(x-1)(x^2+1)} dx$

Example

Integrate $\int_{-2}^2 \frac{x^2+x}{(x-4)(x^2+4)} dx$

Differentiation**Example**

Write $\frac{3x^2 - 3x - 2}{(x-1)(x-2)}$ as partial fractions and hence differentiate it.

Example

Split $\frac{x^4}{(x^2+4)(x-2)^2}$ into partial fractions and hence differentiate it

Binomial Expansion**Example**

Find the Binomial expansion of $\frac{5x-4}{(x+2)(x^2+3)}$ up to and including the term in x^2