

Lecture 23: Worksheet

Improper integrals

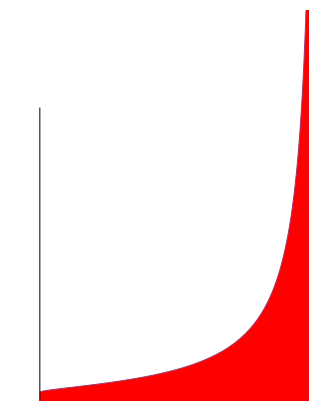
- 1 Find the value of the improper integral

$$\int_1^{\infty} \frac{1}{x^{11}} dx$$



- 2 Find the following improper integral

$$\int_0^1 \frac{1}{\sqrt{1-x}} dx.$$



- 3 We have met the **Maria Agnesi** function

$$f(x) = \frac{1}{1+x^2}$$

early in the course already. Evaluate the integral

$$I = \int_{-\infty}^{\infty} \frac{1}{1+x^2} dx$$

The function $g(x) = \frac{1}{I} \frac{1}{1+x^2}$ is a probability distribution called **Cauchy distribution**. It is a nonzero function which has the property that $\int_{-\infty}^{\infty} g(x) dx = 1$.

