

INTRODUCTION TO CALCULUS

MATH 1A

UNIT 22: WORKSHEET

Improper Integrals

Problem 1: Find the value of the improper integral

$$\int_1^{\infty} \frac{1}{x^{17}} dx$$

Problem 2: Find the following improper integral

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



Problem 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 $\int_{-\infty}^{\infty} g(x) dx = 1$.

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