CALCULUS

Bachelor in Informatics Engineering

Course 2022–2023

Improper integrals

Problem 11.1. Study the convergence of the following improper integrals.

$$\int_3^{+\infty} \frac{\ln^2(x)}{x}\,dx\,.$$

$$\int_1^{+\infty} \sin\left(\frac{1}{x}\right)\,dx\,.$$

$$\int_1^{+\infty} \frac{\sin(x)}{1+x^3}\,dx\,.$$

$$\int_1^{+\infty} \frac{dx}{x^\alpha\sqrt{1+x^2}}\,,\quad \alpha>0\,.$$

$$\int_1^{+\infty} \left(\frac{1}{\sqrt{x}} - \arctan\left(\frac{1}{\sqrt{x}}\right)\right)\,dx\,.$$

$$\int_2^7 \frac{dx}{x^3-8}\,.$$

$$\int_0^2 \frac{\arctan(x)}{x+x^2}\,dx\,.$$

$$\int_1^2 \frac{\ln(x)+x-1}{(x-1)^{3/2}}\,dx\,.$$

$$\int_1^{+\infty} \frac{x}{\sqrt{x^4-1}}\,dx\,.$$

$$\int_0^{+\infty} x^n e^{-x}\,dx\,,\quad n\in\mathbb{N}\,.$$

$$\int_{-\infty}^{+\infty} e^{-x^2}\,dx\,.$$

$$\int_0^1 x^{\alpha-1}(1-x)^{\beta-1}\,dx\,,\quad \alpha,\,\beta>0\,.$$