

Tarea 1¹

1. Determine for which values of x the integrand is defined and evaluate the integrals:

(i) $\int_{-1}^1 \frac{1}{x^3 - 8} dx.$

(ii) $\int \frac{x^2}{\sqrt{4x - x^2}} dx,$

(iii) $\int_1^{\sqrt{e}} x \ln x dx,$

(iv) $\int \frac{\pi x^3 + 3}{\pi x^4 + 12x} dx,$

(v) $\int \frac{x + 4}{x^3 - 1} dx.$

2. (i) Let $f : [0, \infty) \rightarrow \mathbb{R}, f(x) := \sqrt{x}$. Explain why $\int_0^{\infty} f(x) dx$ is an improper integral. Does it converge or diverge? Compute its value if possible.

- (ii) Does the improper integral $\int_0^{\pi} \tan x dx$ exist? Justify your answer and compute the value of the integral if it exists.

- (iii) Does the following integral $\int_0^{\infty} \frac{1}{x^2 + 2x + 1} dx$ exist? If it exists, compute its value, otherwise explain why it does not exist.

3. Let C be the curve described by $y = \cosh x, 0 \leq x \leq \pi$. Compute the arc length of C .

¹Hand in until Tuesday, 26. August