

Introduction to Analysis 2 (42001/52001)

HW10, due April 23

Instructor: Prof. Artem Zvavitch

Problem 1. *Let*

$$f(x) = \sum_{k=1}^{\infty} \frac{\cos(kx)}{k^2}.$$

Prove that

$$\int_0^{\pi/2} f(x)dx = \sum_{k=1}^{\infty} \frac{(-1)^k}{(2k+1)^3}.$$

Problem 2. *Find the largest subset of \mathbb{R} on which $\sum_{k=1}^{\infty} \frac{x^{3k}}{k}$ is convergent.*

Problem 3. *Find the Taylor series expansion around zero of $\text{Arctan}(x)$, find the radius of convergence of this series.*

Problem 4. *Find a series expansion for $\int_0^x e^{-t^2} dt$.*