

PRACTICE EXAM 1 385 FALL 2004

Problem 1. Find a Fourier series for the function $f(x) = \cos(\frac{x}{4}) + 1$ where $-\pi < x < \pi$.

Problem 2. Given function $f(x) = x^8 + 1 + \sin(\pi x)$ for $x \in [0, 1]$ Consider the even and odd extensions of this function on the segment $[-1, 1]$ and associated Fourier series. For each x from the interval $[-1, 1]$ find values to which these Fourier series are convergent.

Problem 3. Fourier series of a function

$$f(x) = \frac{1 - e^x}{x} \quad -\pi < x < \pi$$

converges at every point. To what value does the series converge at an arbitrary point x from the interval $(-\pi, \pi)$?

Problem 4. The periodic function $f(x)$ with the period $p = 2$ given by formula

$$f(x) = \begin{cases} (a^2 - 1)(1 + \cos(\pi x)) & x \in [0, 1] \\ \sin(\pi x) & x \in [-1, 0] \end{cases}$$

Find all values of the parameter a such that the corresponding Fourier series converges uniformly to $f(x)$ on the segment $[-1, 1]$.