

Math 436
October 13, 1999

MIDTERM

On questions with yes or no answers, you must give a reason. Show all your work. If you use a theorem, state that you are using it. There is a table of Fourier series at the end of the exam, which you may find useful. If you find you are doing a horrendous calculation, you are making a mistake or at least making the problem unnecessarily difficult.

1. (10 points) Find the Fourier series of $\sin 8245390x$ on the interval $-\pi < x < \pi$. (Hint: Think!)

2. (10 points) Does the Fourier sine series of x converge to x on $(0, \pi)$? If so, does it converge uniformly?

3. (15 points) Find:

a) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$.

b) $\sum_{n=1}^{\infty} \frac{1}{n^2}$.

4. (15 points) Find all separated solutions of:

$$u_t = u_{zz}, \quad -\pi < z < \pi, \quad t > 0,$$
$$u_z(-\pi, t) = 0 = u_z(\pi, t),$$