

MATH 173: HOMEWORK #2

ALEX IOSEVICH

1. PROBLEMS NOT IN THE BOOK

Problem #1: Compute

$$\sum_{k=1}^{\infty} \frac{k}{2^k}$$

by completing the outline below. This is designed to emphasize the ideas behind the technique of the proof of Theorem 8 in the book.

i) Write $k = \sum_{i=1}^k 1$ and insert it into the sum above, obtaining

$$\sum_{k=1}^{\infty} \sum_{i=1}^k \frac{1}{2^k}.$$

Reverse the order of summation and show that the expression above equals

$$\sum_{i=1}^{\infty} \sum_{k=i}^{\infty} \frac{1}{2^k}.$$

ii) Develop a formula for

$$\sum_{k=A}^{\infty} \frac{1}{2^k}$$

and use it twice in part i) to see that

$$\sum_{k=1}^{\infty} \frac{k}{2^k} = 2.$$

Problem #2: This will become relevant later in the semester. Prove that

$$\left| \int_0^R \frac{\sin(x)}{x} dx \right| \leq C < \infty, \text{ where } C \text{ is independent of } R.$$

2. PROBLEMS FROM THE BOOK

Section 1.4: 2,3,7,8

Section 1.5 1,2