

MATH 173, FALL2022, HOMEWORK #3

ALEX IOSEVICH

1. PROBLEMS NOT IN THE BOOK

Problem #1: Let

$$f(x) = \sum_{n=0}^{\infty} x^n.$$

i) Prove that if $|x| < 1$, $f(x)$ is twice continuously differentiable. You may consult Spivak's Calculus book for this - I just want you to remember how it works.

ii) Prove that if $|x| < 1$, then $f(x) = \frac{1}{1-x}$, resulting in the identity

$$\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}.$$

iii) Differentiate both sides of identity above twice and use it to compute

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

2. PROBLEMS FROM THE BOOK

Section 1.6: 3,4,5,7,8,9