MATH 265H: HOMEWORK #2

ALEX IOSEVICH

1. Problems not in the book

Problem: Let A denote the subset of the positive integers consisting of numbers that **do not** have a 5 in their base 10 representations. For example, 152 is not in there, but 1237 is.

i) Prove that there exists a constant C independent of R such that

$$\#\{A \cap [1, R]\} \leq CR^{\frac{\log(9)}{\log(10)}},$$

and conclude that

$$\lim_{R\to\infty} \frac{\#\{A \cap [0, R]\}}{R} = 0.$$

ii) Use the ideas you developed to prove i) to show that

$$\sum_{k\in A} \frac{1}{k^\alpha}$$

converges if and and only if $\alpha > \frac{\log(9)}{\log(10)}$.

2. Problems from the book

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