

1. Show that it is not possible to fit uncountably many disjoint circular discs in the plane (\mathbb{R}^2). Note that the discs cannot just be single points.

2. a) How many non-decreasing functions from \mathbb{N} to \mathbb{N} are there?
b) How many non-increasing functions from \mathbb{N} to \mathbb{N} are there?

3. Prove that $|\mathbb{R}^2| = |\mathbb{R}|$
Hint: consider the decimal expansions of real numbers, and find some injective way to combine two real numbers into one.