Math 429, Extra Credit Problems

That is hard and interesting problems, the solutions should
be presents orally before April 19. It might improve your score,
but should be used for fun. Only the first solution will be graded.

1. Find three disjoint open sets in the real line which have the same nonempty boundary.

2. How many pairwise distinct sets can one obtain from of a single set by using the operators closure and interior?

3. Prove that the set of rational numbers $\mathbb{Q}$ is not an intersection of a countable collection of open sets in $\mathbb{R}$.

4. Construct a continuous function $f\colon [0,1] \to [0,1]$ such that f takes every value in $[0,1]$ an infinite number of times.