

Exercise No. 2  
**Peer-To-Peer Networks**  
Winter 2016

**Exercise 1** *Given a CAN with a perfectly balanced distribution of  $n$  peers with two dimensions and two realities. Consider the greedy algorithm, which chooses the closest peer according to the distance metric in both realities.*

- 1. How many peers are in distance  $r$  from a given peer, if one does not change the reality? Denote by  $L$  this set of peers.*
- 2. How many random peers  $x$  have to be picked from the set of all peers, such that at least one node of  $L$  is picked, e.g.  $\frac{1}{2}$ ? What if we want to achieve high probability?*
- 3. Find the optimal  $L$  such that  $x + r$  are minimal.*
- 4. What is the relationship between  $x + r$  and the duration of the greedy search?*