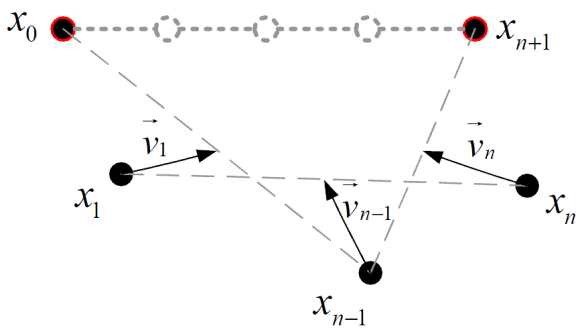
E3 - Multiagent systems

Start from the simple special case of multiagent interaction. Consider N agents in the plane. Their task is to stay equidistantly on a segment between two given points x_0 and x_{N+1}.



The proposed strategy: each i-th agent tends to allocate itself in the middle of a segment with the endpoints in its $(i-1)$-th and $(i+1)$-th neighbors. In this case the agents use information from their neighbours only (the i-th agent communicates with $(i-1)$-th and $(i+1)$-th agents).

Tasks for Week 1

1. Write down the equations describing the agent's dynamics in the form:

$$\dot{x}_i = \sum_{j=1}^{N} a_{ij}(x_j - x_i) \quad \text{or} \quad \dot{x} = Ax$$

2. Characterize matrix A. Describe as many properties of A as you can.

3. Model the proposed dynamics. Show that for difference initial coordinates the agents remain capable to reach their goal.