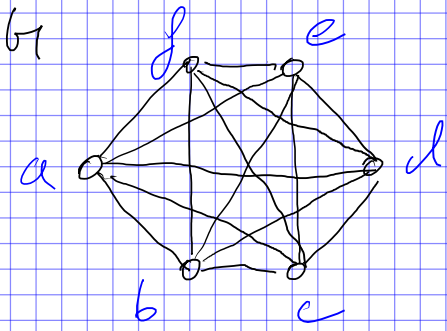


#### 4 MST - Approximation (Niveau I)

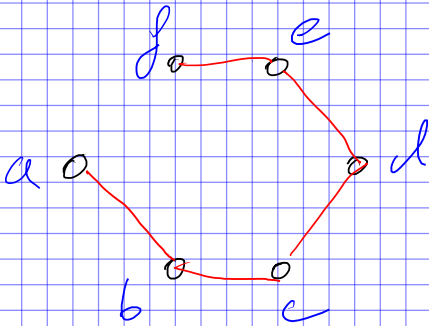
1. Construct a complete graph with at least 6 nodes that satisfies the triangle inequality and apply the MST-approximation algorithm to approximate the optimal solution of the TSP.



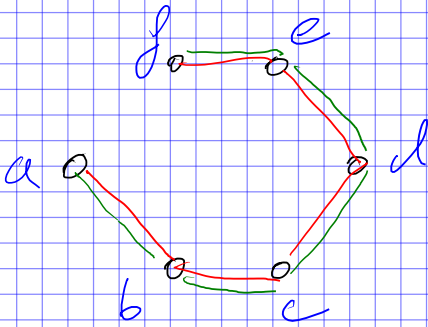
Assign weight of  $x$  to all edges.  
Then

$$w(i,j) + w(j,k) \geq w(i,k) \\ \forall i, j, k \in G$$

Compute MST

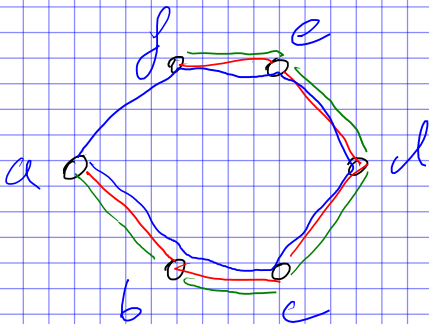


Double edges and find Eulerian Path



$$EP = (a, b, c, d, e, f, e, d, c, b, a)$$

Convert to Hamilton Cycle



$$HC = (a, b, c, d, e, f, a)$$

The Minimal Spanning Tree is by definition a graph, which connects all nodes and is minimal over all weights.

$$\min \sum_{e \in ST} w(e)$$

ST = Spanning Tree

By doubling all edges the length of the found solution is

$$\leq 2 \cdot \sum_{e \in MST} w(e)$$

Thus it is a 2-approximation