# Mathematical modelling

* Make a parallel between our problem and that of the TSP:

Our problem is similar to that of the TSP. Indeed, in both cases, it is a matter of finding a path that connects a set of cities while minimizing the total distance travelled. The main difference is that in the TSP all cities need to be visited only once, whereas in our problem only a subset of cities needs to be connected. However, as in the TSP, our problem requires finding a path that allows us to return to the starting point.

* Formulate the optimization and the decision problem associated:

Considering an undirected weighted graph G = (N, M, w), where N is the set of cities, M is the set of streets connecting the cities, and w is a weight function associated with each edge (representing the length of streets). Consider a subgraph of G, G'= (N', M', w') which represents the set of cities concerned by the tour.

Optimization problem: Find the shortest Hamiltonian cycle in the subgraph G'.

Associated decision problem: Given an integer k, can we find a Hamiltonian cycle to manage the delivery round so that the distance travelled is less than or equal to k, k being the minimum distance to be travelled?