**Prosit 2 : NO COMPLEX**

https://moodle.cesi.fr/pluginfile.php/146956/mod\_resource/content/2/co/\_2\_-\_Prosit\_Outils\_theoriques\_pour\_l\_optimisation\_-\_EN\_23\_03\_23.html

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**Keywords**

* Management of delivery routes
* Optimization problem
* Shorter paths
* Decision problem
* Compplexity class (asymptomatic)
* Traveling Salesman Problem
* Heuristic
* Exponential complexity
* Metric version
* NP-Complete/NP
* Polynomial-time reduction
* Turing Machine
* Certificate algorithm
* Decision problem modeling
* Modern computing system

**Context**

Fanomezantsoa’s one - You and Agathe are tackling the challenge of optimizing delivery routes, but before jumping into algorithm design, Agathe emphasizes the need to properly model the problem, understand its complexity, and determine whether it's NP-Complete, guiding your approach toward feasible solutions.

**Problematic**

Joris’ one - How does determining the complexity class of the decision problem impact the approach to solving the optimization problem ?

Chaima’s one - What strategies can be employed to effectively optimize delivery routes, considering the complexities associated with the decision problem?

**Constraints**

* Prove NP
* Should go through every city
* Time optimization

**Solution approach**

* Applying TSP, heuristic, certificate algorithm
* Proving TSP (find existing proof)
* Finding complexity class
* Heuristic algorithm

**Action plan**

* Study :
  + TSP (verify its relevance for the prosit)
  + NP / NP types / classes
  + Heuristic algorithm
  + Decision problem (what/why/how ?) / Optimization
* Compare decision & optimization problem
* Understand the complexity class it falls under
* Write optimized algorithm that respects constraints

**Delivrables**

* Which complexity class it falls to prove it
* Algorithm (not high priority but check)