# Why This Problem is Difficult

The problem of finding the best possible overall driver and rider matching (i.e. global best solution) is just a version of a well-known problem called the Vehicle Routing Problem (VRP), which is stated as:

> "The Vehicle Routing Problem or VRP is a combinatorial optimization and nonlinear programming problem seeking to service a number of customers with a fleet of vehicles. Proposed by Dantzig and Ramser in 1959, VRP is an important problem in the fields of transportation, distribution and logistics. Often the context is that of delivering goods located at a central depot to customers who have placed orders for such goods. Implicit is the goal of minimizing the cost of distributing the goods. **Many methods have been developed for searching for good solutions to the problem, but for all but the smallest problems, finding global minimum for the cost function is computationally complex.**"
>
> –Wikipedia entry for Vehicle Routing Problem

It is classified as an NP-Hard problem, meaning that no known polynomial-time algorithms for solving it exist.  If we approached solving it in the naïve sense, i.e. try every possible solution, reaching a solution would take an amount of time that exceeds the history of the known universe.

To top it off, Rideshare includes scheduling and preference matching, and allows for arbitrarily many depots.

Our approach involved using three different algorithms which were developed by many of our wise predecessors, and adapted by us.