In this thesis, the computational complexity and approximability of several problems in a priori routing and graph search is studied. Specifically, the following results are presented:

- A constant-factor approximation for the a priori traveling repairman problem in the uniform model.
- Hardness and inapproximability results for the a priori traveling salesman problem in the scenario model. Further, constant-factor approximations are provided when the number of scenarios is bounded, when the scenarios are big, and when the scenarios are nested.
- The complexity of the master tour problem is settled. To understand this result, the polynomial hierarchy is briefly discussed.
  - Approximability and complexity of the multi-target graph search problem and the Canadian traveler problem. First, a constant-factor approximation for the multi-target graph search problem in the independent decision model is presented. It is also shown that the Canadian traveler problem in the independent decision model is NP-hard on series-parallel graphs. In the scenario model, NP-hardness is shown for disjoint-path graphs and cactus graphs.
  - An analysis of the lost cow problem and, in particular, a characterization of distributions for which it is optimal not to turn.
  - The graph parameter starwidth is introduced and studied, and its relation with the traveling repairman problem is discussed.

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