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Mathematical Models for the Capacitated Vehicle Routing Problem, and variants

This lesson concerns the well-known capacitated vehicle routing problem, and presents several mathematical formulations in mixed integer linear programming. Some models are based on a polynomial number of variables and constraints, while others rely on exponential numbers of variables or columns. The student will learn how to compare formulations and generate dynamically columns and/or rows in a branch-and-cut-and-price framework. All the models are implemented in a companion Julia code to help a reader better understand each formulation's advantages and disadvantages. The formulations are presented in the morning sessions, while the afternoon sessions will be devoted to the implementation issues. This lesson is based on Chapter 7 of the forthcoming book "Handbook on Transport Modeling" (Edward Elgar Publishing 2025).