Exercise 1

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Homework Problem 1. (The brachistochrone problem)

The brachistochrone problem (Example 1.1) is the problem of finding the time-optimal trajectory of a mass moving from point A to point B under gravitational load.

Derive the corresponding optimization problem (1.1), i. e., expand the description from the lecture notes.

Homework Problem 2. (The crane-trolley-problem)

The crane-trolley-problem (Example 1.5) is the problem of finding the time-optimal control for steering the state-trajectory of a system comprised of a mass connected to a vertically fixed carriage system (which control forces can act on horizontally) by a massless fixed rod into a target state under gravitational load.

Derive the corresponding optimization problem (1.9), i. e., expand the description from the lecture notes.

You are not expected to turn in your solutions.