A Simple Solution to the Finite-Horizon LQ Problem with Zero Terminal State.

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Abstract: This short paper deals with the classical finite-horizon linear-quadratic regulator problem with the terminal state constrained to be zero, for both continuous and discrete-time systems. Closed-form expressions for the optimal state and costate trajectories of the Hamiltonian system, as well as the corresponding control law, are derived through the solutions of two infinite-horizon LQ problems, thus avoiding the use of the Riccati differential equation. The computation of the optimal value of the performance index, as a function of the initial state, is also presented.