

# LQR in finite time horizon: optimal control

LQR problem: find  $u_0^{\text{lqr}}, \dots, u_{N-1}^{\text{lqr}}$  that minimizes  $J(U)$

⇒ The optimal control is:

$$u_t^{\text{lqr}} = K_t x_t$$

⇒ where

$$K_t := -(R + B^T P_{t+1} B)^{-1} B^T P_{t+1} A$$

$$P_N := Q_f$$

$$P_{t-1} := Q + A^T P_t A - A^T P_t B (R + B^T P_t B)^{-1} B^T P_t A$$