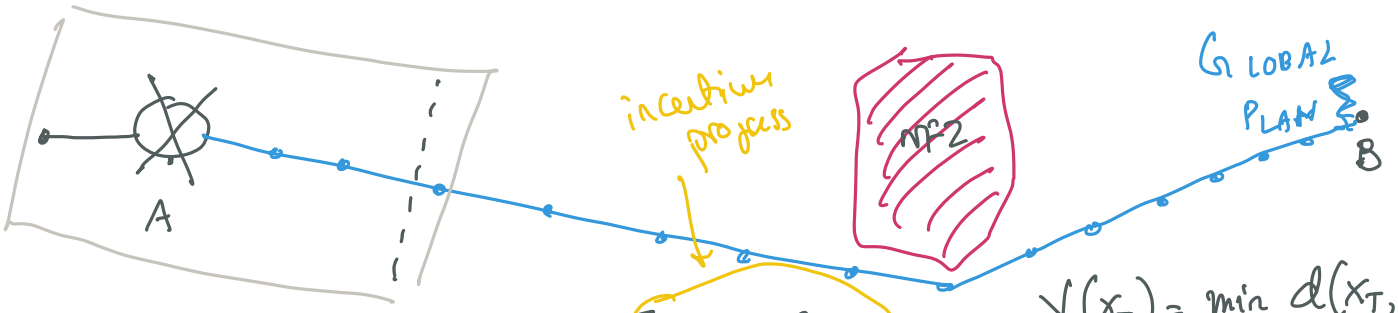
Long horizon

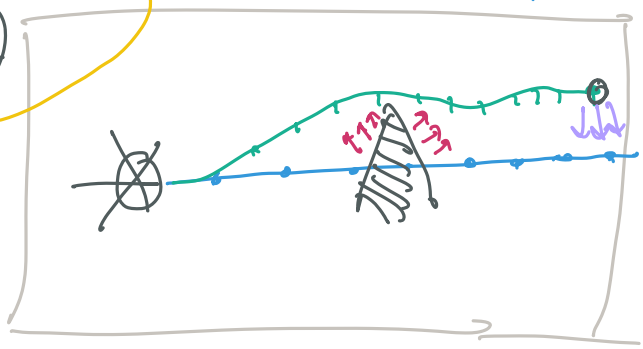


$$V(X_T) = \min_{x \in \mathcal{G}} d(X_T, x)$$

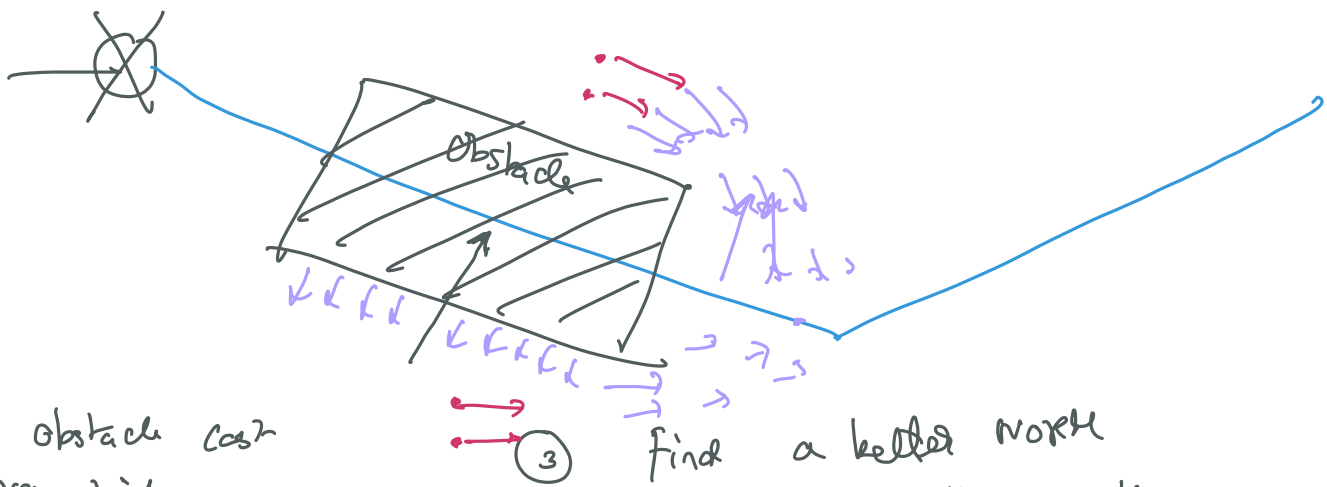
TERMINAL COST

$$\min_{x_1, u_1, x_2, u_2 \dots} \sum_{t=1}^{T} C(x_t, u_t) + V(x_T)$$

$$x_{t+1} = f(x_t, u_t)$$



$$V(X_T) = \min_{x \in \mathcal{G}} \|x - X_T\|$$



① Make obstacle cost very high

② Increase your horizon

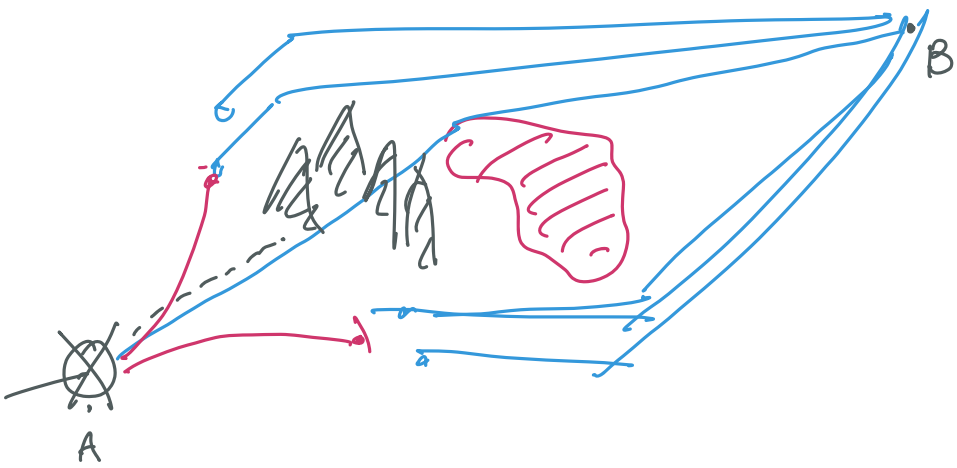
③ Find a better worst $\min_{x \in \mathcal{G}} \|x - X_T\|$ closest point.

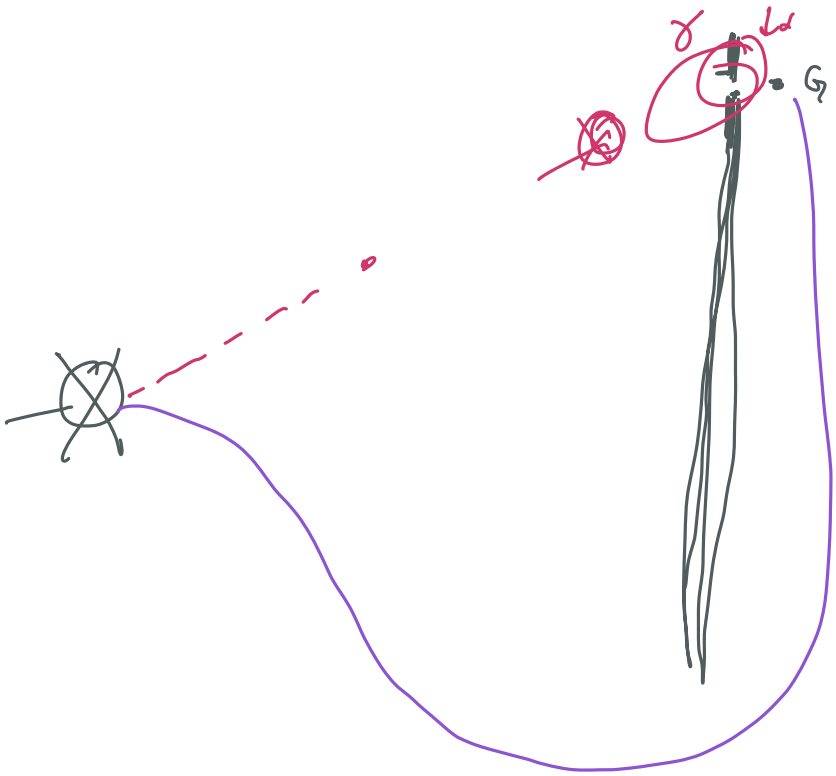
If you could plan all the way to the goal

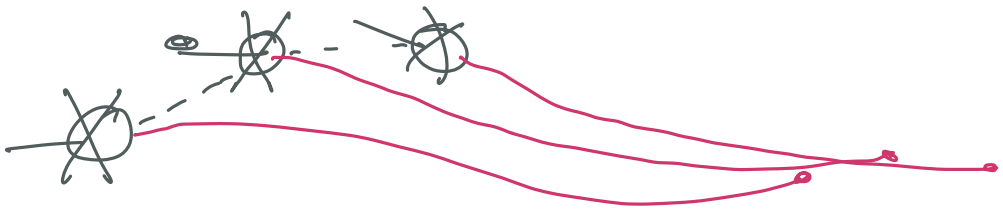
$$\min \quad c(x_1, u_1) + c(x_2, u_2) + \cdots + c(x_{T_{big}}, u_{T_{big}})$$

$$\min \quad c(x_1, u_1) + \cdots c(x_T, u_T) + V^*(x_T)$$

Q: How can we approximate







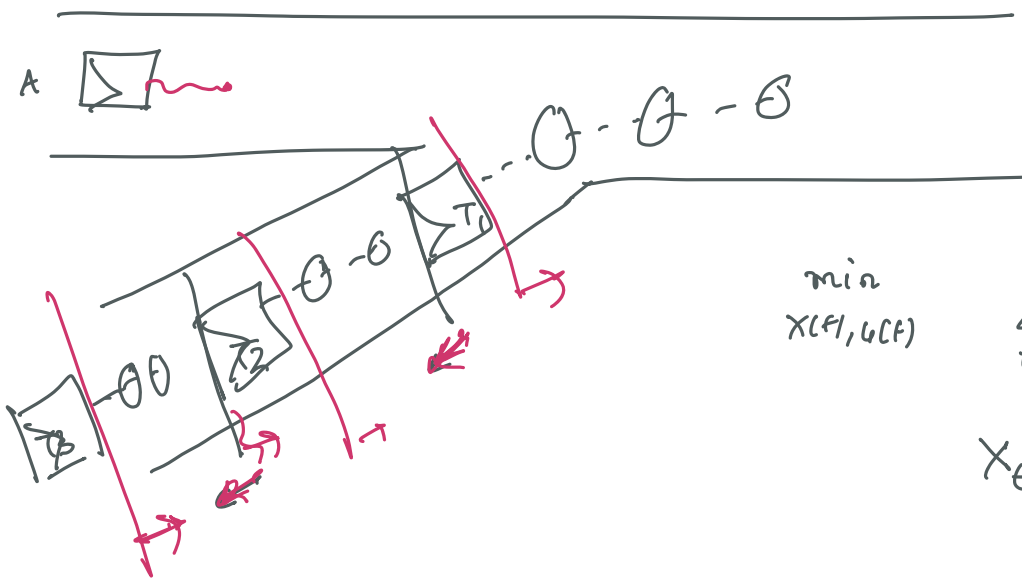
WIND

GLOBAL PLANNER

x, y, ψ

LOCAL PLANNER

iLQR



$$\min_{x(f),u(f)} \sum_{t=1}^{T} C_t(x_t, u_t) + V(x_T)$$

$$x_{t+1} = f(x_t, u_t)$$