

# Planning problem

(1) State space

$$\underline{s}_t \in S = \{ (x, y) \}$$

(2) Action space

$$\underline{u}_t \in U(\underline{s}_t) = \begin{cases} (0, -1) \\ (0, 1) \\ (1, 0) \\ (-1, 0) \end{cases}$$

(3) State transition function

$$(-1, 0)$$

$$\underline{s}_{t+1} = f(\underline{s}_t, \underline{u}_t)$$

$$\underline{s}_{t+1} = \underline{s}_t + \underline{u}_t$$

$$\underline{s}_{t+1} = \begin{cases} \begin{bmatrix} x \\ y+1 \end{bmatrix} & \text{if } u_t = 0 \\ \begin{bmatrix} x \\ y-1 \end{bmatrix} & \text{else if } u_t = -1 \end{cases}$$

if we encoded

$$U = \{0, 1, 2, 3\}$$

(4) Initial state

$$\underline{s}_I \in S$$

(5) Goal states

$$\underline{s}_G \subseteq S$$

