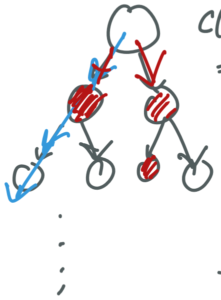

$c(s,a) = \mathbb{1}(a \neq \pi^*(s))$

$J(\pi) - J(\pi^*)$

π makes mistake w/ prob ε on expert states.

$$J(\pi^*) = \sum_{t=0}^{T-1} \mathop{\mathbb{E}}_{s_t \sim d_t^{\pi^*}} c(s_t, \pi^*(s_t)) = \; ? \; 0$$

$$J(\pi) = \sum_{t=0}^{T-1} \mathop{\mathbb{E}}_{s_t \sim d_t^{\pi}} c(s_t, \pi(s_t))$$

$$= \varepsilon \times (\underbrace{1 + 1 + 1 + \cdots\cdots}_{T})$$

$$+ (1-\varepsilon) \times (0 + \varepsilon \times (\underbrace{1+1+1 \cdots\cdots}_{T-1})$$

$$+ (1-\varepsilon) \times (0 + \cdots\cdots)$$

$$= \varepsilon T + (1-\varepsilon)\varepsilon(T-1) + (1-\varepsilon)^2 \varepsilon (T-2) + \cdots\cdots$$

$$= \varepsilon\Big(T + \underset{\leq 1}{(1-\varepsilon)}(T-1) + \underset{\leq 1}{(1-\varepsilon)^2} \cdot (T-2) + \cdots\cdots\Big)$$

$$\leq \varepsilon\big(T + (T-1) + (T-2) + \cdots 3 + 2 + 1\big)$$

$$\leq \varepsilon \cdot \frac{T(T+1)}{2} \approx O(\varepsilon T^2)$$