

# CS 747, Autumn 2020: Week 5, Q&A

Shivaram Kalyanakrishnan

Department of Computer Science and Engineering  
Indian Institute of Technology Bombay

Autumn 2020

# Erratum

- See Slide 18 from the Week 5 lecture.
-

# Erratum

- See Slide 18 from the Week 5 lecture.
- 

We use:  $\max_a f(a) - \max_a g(a) \geq \max_a (f(a) - g(a))$ .

$$\begin{aligned} & (B^*(X))(s) - (B^*(Y))(s) \\ &= \max_{a \in A} \sum_{s' \in S} T(s, a, s') \{R(s, a, s') + \gamma X(s')\} - \\ & \quad \max_{a \in A} \sum_{s' \in S} T(s, a, s') \{R(s, a, s') + \gamma Y(s')\} \\ &\geq \gamma \max_{a \in A} \sum_{s' \in S} T(s, a, s') \{X(s') - Y(s')\} \geq 0. \end{aligned}$$

# Erratum

- See Slide 18 from the Week 5 lecture.

We use:  $\max_a f(a) - \max_a g(a) \geq \min_a (f(a) - g(a))$ .

$$\begin{aligned} & (B^*(X))(s) - (B^*(Y))(s) \\ &= \max_{a \in A} \sum_{s' \in S} T(s, a, s') \{R(s, a, s') + \gamma X(s')\} - \\ & \quad \max_{a \in A} \sum_{s' \in S} T(s, a, s') \{R(s, a, s') + \gamma Y(s')\} \\ &\geq \gamma \min_a \sum_{s' \in S} T(s, a, s') \{X(s') - Y(s')\} \geq 0. \end{aligned}$$

# Question 1

- What are the variables being optimised in the LP formulation?
-

# Question 1

- What are the variables being optimised in the LP formulation?

$$\text{Maximise } \left( - \sum_{s \in S} V(s) \right)$$

subject to

$$V(s) \geq \sum_{s' \in S} T(s, a, s') \{ R(s, a, s') + \gamma V(s') \}, \forall s \in S, a \in A.$$

# Question 1

- What are the variables being optimised in the LP formulation?

$$\text{Maximise } \left( - \sum_{s \in S} V(s) \right)$$

subject to

$$V(s) \geq \sum_{s' \in S} T(s, a, s') \{ R(s, a, s') + \gamma V(s') \}, \forall s \in S, a \in A.$$

Say  $S = \{s_1, s_2, s_3\}$ . The 3 variables are  $V_1, V_2, V_3$ , which we have denoted  $V(s_1), V(s_2), V(s_3)$ , respectively. The solution will set  $V_i = V^*(s_i)$ .