

# assignment4

March 19, 2021

$$q_1(s_1, a_1) = 8 + 0.2 \cdot 10 + 0.6 \cdot 1 = 10.6$$

$$q_1(s_1, a_2) = 10 + 0.1 \cdot 10 + 0.2 \cdot 1 = 11.2$$

$$q_1(s_2, a_1) = 1 + 0.3 \cdot 10 + 0.3 \cdot 1 = 4.3$$

$$q_1(s_2, a_2) = -1 + 0.5 \cdot 10 + 0.3 \cdot 1 = 4.3$$

$$v_1(s_1) = 11.2$$

$$v_1(s_2) = 4.3$$

$$\pi_1(s_1) = a_2$$

$$\pi_1(s_2) = \{a_1, a_2\}$$

$$q_2(s_1, a_1) = 8 + 0.2 \cdot 11.2 + 0.6 \cdot 4.3 = 12.82$$

$$q_2(s_1, a_2) = 10 + 0.1 \cdot 11.2 + 0.2 \cdot 4.3 = 11.98$$

$$q_2(s_2, a_1) = 1 + 0.3 \cdot 11.2 + 0.3 \cdot 4.3 = 5.65$$

$$q_2(s_2, a_2) = -1 + 0.5 \cdot 11.2 + 0.3 \cdot 4.3 = 5.89$$

$$v_2(s_1) = 12.82$$

$$v_2(s_2) = 5.89$$

$$\pi_2(s_1) = a_1$$

$$\pi_2(s_2) = a_2$$

if  $k > 2$ , then  $v_{k-1}(s_1) \geq v_2(s_1) > 10$ ,  $v_{k-1}(s_2) \geq v_2(s_2) > 5$ .

$$q_k(s_1, a_1) - q_k(s_1, a_2) = -2 + 0.1 \cdot v_{k-1}(s_1) + 0.4 \cdot v_{k-1}(s_2) > 0$$

$$q_k(s_2, a_1) - q_k(s_2, a_2) = 2 - 0.2 \cdot v_{k-1}(s_2) < 0$$

$$\pi_k(s_1) = a_1$$

$$\pi_k(s_2) = a_2$$

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