D3_

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Contents

Exercise 1

How would you genalize this game with arbitraty value of m_1 (minimum increment),m_2 (maximum increment), and N (the winning number)?

- $S = \{1, 2, \ldots, N\}$
- $A = \{a_{m1}, a_{m1} + 1, \ldots, a_{m2}\}$
- a_m means the action of incrementing the previous number by m

When $State = N - a_{m1}$, optimal action $= a_{m1}$

When $State = N - a_{m2}$, optimal action $= a_{m2}$

When $State = N - a_{m1} - l - k * (a_{m1} + a_{m2})\,(l \leq a_{m2} - a_{m1})\,(k : integer)$, optimal action $= a_{m1} + l$

Exercise 2

Two players are to play a game. The two players take turns to call out integers. The rules are as follows. Describe A's winning strategy.

- $S = \{1, 2, \ldots, 100\}$
- $A_{start} = \{4, 5, 6, 7, 8\}$
- $A_B = \{5, 6, 7, 8, 9\}$
- $A_A = \{2, 3, 4, 5, 6\}$

There is no A's winning strategy

Exercise 3

Exercise 4

Formulate the first example in this lecture note using the terminology including state,action, reward, policy, transition. Describe the optimal policy using the terminology as well.

- $S = \{1, 2, \ldots, 31\}$
- $A = \{a_1, a_2\}$
- a_m means the action of incrementing the previous number by m
- $R(30, a_1) = R(29, a_2) = 1$ otherwise 0
- optimal policy: $\pi(N - a_1 - k * (a_1 + a_2))\,(k : integer) = a_1$
- optimal policy: $\pi(N - a_2 - k * (a_1 + a_2))\,(k : integer) = a_2$