2300012929 尹梓祺

一.

$S_2' = \frac{1}{3}(R(2\to1)+R(2\to3)+R(2\to6)+\gamma(S_1+S_3+S_6)) \doteq 3.07$

$S_3' = \frac{1}{2}(R(3\to2)+R(3\to7)+\gamma(S_2+S_7)) = 1.495 \doteq 1.50$

$S_4' = \frac{1}{3}(R(4\to0)+R(4\to5)+R(4\to8)+\gamma(S_0+S_5+S_8)) = -\frac{8}{3} \doteq -2.67$

$S_5' = \frac{1}{4}(R(5\to1)+R(5\to6)+R(5\to9)+R(5\to4)+\gamma(S_1+S_6+S_9+S_4)) = -0.9$

二.

(1) 有. (U,π)

(2) 无纯策略纳什均衡.

设 A 选 U 概率为 P. B 选 π 概率为 q.

则对 A 收益: $V = 2pq - 6p(1-q) - 3(1-p)q + 3(1-p)(1-q)$

$= 2pq - 6p + 6pq - 3q + 3pq + 3 - 3p - 3q + 3pq$

$= 14pq - 9p - 6q + 3$

$V_{\max\min} = \max_p \min_q (14pq - 9p - 6q + 3)$

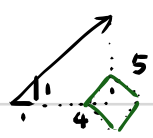
$14p - 6 = 0$

$= -\frac{6}{7} \quad (p = \frac{3}{7},\ q = \frac{9}{14})$

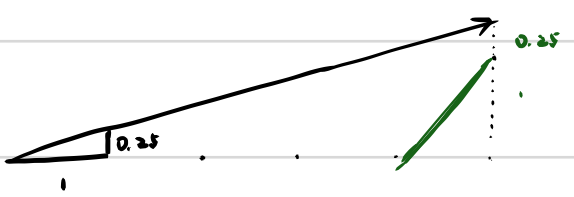
∵ 零和博弈 ∴ $V_{\max\min} = V_{\min\max} = -\frac{6}{7}$ 混合策略纳什均衡为 A 以 $\frac{3}{7}$ U.

B 以 $\frac{9}{14}$ π.

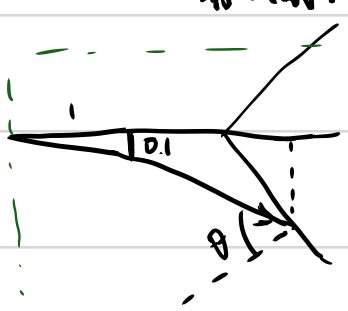
A 收益为期望 $-\frac{6}{7}$

三. (1) (0,1,0): 

射线射向环境 ∴ $I_1 = 0.3$



射线射向环境 ∴ $I_2 = 0.3$.



$\begin{cases} y = -0.1z - 0.1 \\ y + z = 3 \end{cases}$ ⇒ 交点 $(0, -\frac{4}{9}, \frac{31}{9})$

⇒ $\begin{cases} \tan\theta = \frac{11}{9} \\ \cos\theta \doteq 0.63 \end{cases}$

$\therefore I_3 = 0.2 \cdot 0.3 = 0.06$ （反射环境光）

(2)

(0,1,0) $I_1' = 0.2 \cdot 0.3 + 0.8 \cdot 0.8 \cdot \frac{\sqrt{2}}{2} \approx 0.512$

$I_2' = 0.2 \cdot 0.3 + 0.8 \cdot 0.8 \cdot \frac{\sqrt{2}}{2} \approx 0.512$

$I_3' = 0.2 \cdot 0.3 = 0.06$