

## DECISION ANALYSIS – SHORT EXERCISES VIII – CONGESTION AND EXTENSIVE GAMES

I. Consider the below strategic game involving two players, A and B. Is it a potential game? If so, define the underlying potential function with  $P(T,L) = 10$ .

A \ B	L	R
T	2 \ 2	1 \ 1
B	3 \ 0	1 \ 1

The game is not potential:

$$P(T,L) = 10$$

$$P(T,R) = 9$$

$$P(B,L) = 11$$

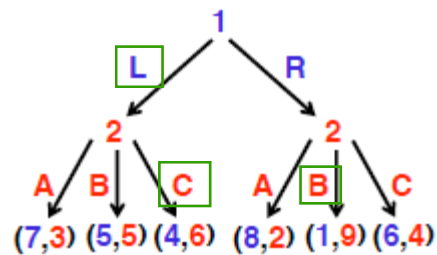
$$P(B,R) = 12 \text{ and } 10$$

II. Consider the below strategic game involving two players, A and B. Does it have a finite improvement property? If so, identify a pure Nash equilibrium through better response dynamics (mark the path in the table starting in the top-left cell).

A \ B	L	C	R
T	2 \ 1	1 \ 3	4 \ 4
B	0 \ 0	2 \ 1	3 \ 3

(T,L)  $\rightarrow$  (T,C)  $\rightarrow$  (T,R) OR (B,C), but (T,R) yields better response for both A and B, whereas it's just A to be improved in case of choosing (B,C)

III. Consider the below presented extensive game involving two players, 1 and 2. Find a pure Nash equilibrium using the backward induction.



Pure Nash equilibrium: (L, C-B)  $\Rightarrow$  (4,6).