1.2

Problem

> In the following normal-form game, what strategies survive iterated elimination of strictly dominated strategies? What are the pure-strategy Nash equilibria?
>
> | | L | C | R |
> |---|---|---|---|
> | T | $2,0$ | $1,1$ | $4,2$ |
> | M | $3,4$ | $1,2$ | $2,3$ |
> | B | $1,3$ | $0,2$ | $3,0$ |

Solution （1）

B is dominated by T:

	L	C	R
T	$2,0$	$1,1$	$4,2$
M	$3,4$	$1,2$	$2,3$

C is dominated by R:

	L	R
T	$2,0$	$4,2$
M	$3,4$	$2,3$

Then we can't eliminate any other strategies

Solution (2)

(T,R) is a pure-strategy Nash equilibrium:

- Player 1 can't be better off (M,B is $2,3$ seperatly)
- Player 2 can't be better off (L,C is $0,1$ seperatly)

(M,L) is a pure-strategy Nash equilibrium:

- Player 1 can't be better off (M,B is $1,2$ seperatly)

- Player 2 can't be better off (L, C is $2, 3$ seperatly)

1.3

> Players 1 and 2 are bargaining over how to split one dollar. Both players simultaneously name shares they would like to have, s_1 and s_2, where $0 \leq s_1, s_2 \leq 1$. If $s_1 + s_2 \leq 1$, then the players receive the shares they named; if $s_1 + s_2 > 1$, then both players receive zero. What are the pure-strategy Nash equilibria of this game?

Solution

For player 1, given s_2, he will choose:

$$s_1 = 1 - s_2$$

to maximize his payoff

Similarly, player 2 will choose:

$$s_2 = 1 - s_1$$

Both direct us to:

$$s_1 + s_2 = 1$$

Therefore, any (s_1, s_2) that satisfies this formula is a pure-strategy Nash equilibrium.

Moreover, there's a special case:

$$(s_1, s_2) = (1, 1)$$

In this case:

- when a player want to change to any $s > 0$, the sum is over 1 and he receive zero,
- if he changes to $s = 0$, it satisfies $s_1 + s_2 \leq 1$ but he chooses 0 so the payoff is 0,

Therefore, he can't be better off.