

## Nash equilibrium exercise

**Question 1.** Given the following payoff matrix, specify conditions for  $x$  so that

1.  $A$  is a (strictly) dominant strategy for Alice?

2.  $C$  is a (strictly) dominant strategy for Bob?

3.  $(A, C)$  is (strictly) a Nash equilibrium?

4.  $(A, C)$  is (strictly) a *unique* Nash equilibrium?

5. (Bonus) If  $-2 < x < -1$ , and Alice knows that Bob masters game theory, should Alice choose  $A$  or  $B$  or indifferent?

|       |     | Bob       |           |
|-------|-----|-----------|-----------|
|       |     | $C$       | $D$       |
| Alice | $A$ | $(x, x)$  | $(1, -2)$ |
|       | $B$ | $(-1, 2)$ | $(0, 0)$  |

*Solution.* 1.  $x > -1$

2.  $x > -2$

3.  $x > -1$

4.  $x > -1$

5.  $B$

□

**Question 2.** List some examples in real life that can be analyzed by (simple) game theory using payoff matrix. How many Nash equilibria can you find? Is the game outcome in reality indeed a Nash equilibrium?