Previously ... on multi-agent systems (tutorials and lectures).

1. Formal definition of a game $G = (\mathcal{N}, \mathcal{A}, u)$
   - $\mathcal{N}$ – a set of players
   - $\mathcal{A}$ – a set of actions
   - $u$ – outcome for each combination of actions

2. Pure and mixed strategies

3. Nash equilibrium, computation

4. Other equilibria
Task 1: Prove the following corollary.

**Corollary**

Let $s \in S$ be a Nash equilibrium and $a_i, a'_i \in A_i$ are actions from the support of $s_i$. Now, $u_i(a_i, s_{-i}) = u_i(a'_i, s_{-i})$.

Task 2: Construct an LP for the following zero-sum normal-form game (the row player is maximizing the utility, the column player is minimizing).

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<th>L</th>
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<tbody>
<tr>
<td><strong>U</strong></td>
<td>3</td>
<td>4</td>
<td>−1</td>
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<tr>
<td><strong>C</strong></td>
<td>1</td>
<td>2</td>
<td>0</td>
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<td><strong>D</strong></td>
<td>0</td>
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Task 3: A mixed-integer linear program (MILP) is a linear program that includes integer variables. Formulate the problem of computing a NE in a general-sum game as a MILP.

Task 4: Either construct the following game or show that such a game cannot exist: Find a game with 2 actions (pure strategies) for each player such that 1) there are exactly 2 pure Nash equilibria and 2) there is no fully mixed NE (that randomizes over more than 1 pure strategy for a player).

Task 5: Either prove the following statement or give a counterexample: Every convex combination of two different NE is a Correlated equilibrium.
Task 6: Find a Correlated equilibrium that is not a convex combination of NE.