1. Find the Nash equilibria of the game of Question 1 in Homework 1.

2. Find the Nash equilibria of the game of Question 2 Part (b) in Homework 1.

3. Does the following game have (pure-strategy) Nash equilibria? If Yes, find all of them, If No, prove it. Agent A auctions $1,000 to $n$ players ($n \geq 2$). Each player independently submits an envelope containing his/her bid in cash (any integer amount of cash, in dollars, up to $1,000 can be put in the envelope and submitting an empty envelope is allowed). If one player’s bid exceeds all the other bids, then he/she wins the $1,000. If two or more players bid the highest amount then nobody wins. The submitted envelopes are never returned to the players, that is, no player ever recovers his/her bid. Assume that all the players are selfish and greedy, that is, each player cares only about his/her own wealth and prefers more money to less.

4. Consider the following game.

<table>
<thead>
<tr>
<th></th>
<th>Y₁</th>
<th>Y₂</th>
<th>Y₃</th>
<th>Y₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>X₁</td>
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<td>3 , 1</td>
<td>0 , 0</td>
<td>0 , 0</td>
</tr>
<tr>
<td>X₂</td>
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<td>0 , 0</td>
<td>1 , 3</td>
<td>1 , 3</td>
</tr>
<tr>
<td>X₃</td>
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<td>-1 , 0</td>
<td>2 , 1</td>
<td>-1 , 0</td>
</tr>
<tr>
<td>X₄</td>
<td>-1 , 0</td>
<td>0 , 3</td>
<td>-1 , 0</td>
<td>0 , 3</td>
</tr>
</tbody>
</table>

(a) Does Player 1 have a (weakly or strictly) dominant strategy?
(b) Does Player 2 have a (weakly or strictly) dominant strategy?
(c) What is the output of the iterated deletion of weakly dominated strategies?

5. The 31 board members of the BWD Corporation are about to take a secret ballot on whether to accept the merger proposal of Mammoth, Inc. Each member can either vote to accept the proposal or reject the proposal or abstain. In order for the proposal to be accepted, 16 board members must vote to accept it. Each board member only cares about not being in the minority; that is, he/she prefers her vote to be aligned with the majority of votes. Find all the Nash equilibria of this game.
6. Consider the following game, where the payoffs are given in the following order (from top to bottom): player 1, player 2, player 3.

(a) Are there values of $x$ for which Player 1 has a strictly dominant strategy? If your answer is Yes, say what values and what strategy, if your answer is No explain why not.

(b) Are there values of $y$ for which Player 3 has a strictly dominant strategy? If your answer is Yes, say what values and what strategy, if your answer is No explain why not.

(c) Does Player 2 have weakly dominated strategies? (If your answer is Yes, name the strategies and the strategies that dominate them; if your answer is No prove your claim.)

(d) For what values of $y$ does Player 3 have a weakly dominated strategy? Name the strategy.

(e) How many strategies does Player 2 have?

(f) Find all the backward-induction solutions when $x = 1$ and $y = 2$?

(g) Find the backward-induction solution when $x = 1$ and $y = 3$.

(h) Assume that $x = 1$ and $y = 1$. Explain why $(C,D,L)$ is not a Nash equilibrium.

(i) Assume that $x = 1$ and $y = 1$. Explain why $(A,D,H)$ is not a backward-induction solution.

(j) Assume that $x = 1$ and $y = 1$. Is there a Nash equilibrium where Player 1 plays C? If Yes, then say what the equilibrium is, if No then explain why not.