Part I.

<table>
<thead>
<tr>
<th></th>
<th>2a</th>
<th>2b</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>1, 1</td>
<td>100, 0</td>
</tr>
<tr>
<td>1b</td>
<td>0, 100</td>
<td>100, 100</td>
</tr>
</tbody>
</table>

a. PSNE: (1a, 2a) (1b, 2b)
b. Prediction: (1a, 2a)
c. NE can be eliminated. In this case, a NE with higher payoffs for both players is eliminated.

d. |     | X       | Y       |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2*, 0*</td>
<td>0*, 0*</td>
</tr>
<tr>
<td>B</td>
<td>1*, 1*</td>
<td>1*, 1*</td>
</tr>
</tbody>
</table>

e. PSNE: (A, X) (B, Y)
f. SPNE: (A, X) (B, Y)

```
Player I
   /     \
  /       \
A       B
/       / \
X       Y
/       /   \
(2, 0)  (0, 0)
```

```
Player I
   /     \
  /       \
A       B
/       / \
X       Y
/       /   \
(2, 0)  (0, 0)
```
Answer key to Part II of the Midterm

A. Strategic form:

<table>
<thead>
<tr>
<th></th>
<th>Alex</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob</td>
<td>$200</td>
<td>$600</td>
<td>$1000</td>
</tr>
<tr>
<td>Bob</td>
<td>$200</td>
<td>0,0</td>
<td>0,400</td>
</tr>
<tr>
<td>Bob</td>
<td>$600</td>
<td>400,0</td>
<td>0,400</td>
</tr>
<tr>
<td>Bob</td>
<td>$1000</td>
<td>0,0</td>
<td>0,0</td>
</tr>
</tbody>
</table>

4. PSNE: (Bob $200, Alex $600)
   (Bob $600, Alex $600)
   (Bob $1000, Alex $600)
   (Bob $1000, Alex $1000)

MSNE: none

b. Correct answer 1:
Part III

1)

**MICHELLE**

<table>
<thead>
<tr>
<th>q</th>
<th>1-q</th>
</tr>
</thead>
<tbody>
<tr>
<td>issues</td>
<td>personalities</td>
</tr>
<tr>
<td>4, -4</td>
<td>-2, 2</td>
</tr>
</tbody>
</table>

issues (p)

**STEVE**

<table>
<thead>
<tr>
<th>(1-p)</th>
<th>personalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3, 3</td>
<td>1, -1</td>
</tr>
</tbody>
</table>

We have no pure NE. The mixed NE is as follow:

\[4q - 2 + 2q = -3q + 1 - q\]

\[q = \frac{3}{10}\]

\[1-q = \frac{7}{10}\]

\[-4p + 3 - 3p = 2p - 1 + p\]

\[p = \frac{2}{5}\]

\[1-p = \frac{3}{5}\]
2) The sequential game is as follows:

The SPNE: (Issues, Issues/ personalites)

<table>
<thead>
<tr>
<th></th>
<th>P/P</th>
<th>P/I</th>
<th>I/P</th>
<th>I/I</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>1, -1</td>
<td>1, -1</td>
<td>-3, 3</td>
<td>-3, 3</td>
</tr>
<tr>
<td>Steve</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>-2, 2</td>
<td>4, -4</td>
<td>-2, 2</td>
<td>4, -4</td>
</tr>
</tbody>
</table>

The SPNE is (I, I/P)

3) Michelle is better off choosing scenario (b) because she can see what her opponent is doing and pick the opposite strategy to win.
Part IV

a.

\[ \begin{array}{c}
(2, 3, 1) \\
(2, 3, 2) \\
(1, 1, 2) \\
(1, 1, 2) \\
(4, 2, 3) \\
(0, 4, 2) \\
(-3, 2, 1) \\
\end{array} \]

b.

I's strategies: \( \text{ag, ah, bg, and bh} \).
II's strategies: \( \text{ci, cj, di, and dj} \).
III's strategies: \( \text{e and f} \).

c.

\[
\begin{array}{cccc}
\text{ag} & 2, 3, 1 & 2, 3, 1 & 4, 2, 3 & -3, 2, 1 \\
\text{ah} & 2, 3, 1 & 2, 3, 1 & 0, 4, 2 & 0, 4, 2 \\
\text{bg} & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 \\
\text{bh} & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 \\
\end{array}
\]

\[
\begin{array}{cccc}
\text{ag} & 2, 3, 2 & 2, 3, 2 & 4, 2, 3 & -3, 2, 1 \\
\text{ah} & 2, 3, 2 & 2, 3, 2 & 0, 4, 2 & 0, 4, 2 \\
\text{bg} & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 \\
\text{bh} & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 & 1, 1, 2 \\
\end{array}
\]

d.

PSNE: \( \text{(bg, dj, e), (bh, di, e), (ag, ci, f), (ag, ci, f), (bg, dj, f), and (bh, dj, f)} \).
SPNE: \( \text{(ag, ci, f) and (bh, dj, f)} \).

Hiroki