1. (a) The extensive form is as follows:

```
   NATURE
       1/5  4/5
      /    \
     L     R
   A     B
 /     /     /
C     D     C
 
C     D
 
0     0     1     0.5     0.85     0.85     1     0
85    100    85    0.85    85    100    85    0
```

(b) The normal form is as follows (payoffs are expected payoffs):

```
Player 2

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>0.68</td>
<td>85</td>
</tr>
<tr>
<td>AB</td>
<td>0.80</td>
<td>85</td>
</tr>
<tr>
<td>BA</td>
<td>0.88</td>
<td>85</td>
</tr>
<tr>
<td>BB</td>
<td>1.00</td>
<td>85</td>
</tr>
</tbody>
</table>
```

(c) For player 1, AA and AB are strictly dominated by BA (AB is also strictly dominated by BB).

(d) The Nash equilibrium is (BB,C).

2. (a) Describe the state by three numbers \( \begin{pmatrix} n \\ a \\ b \end{pmatrix} \) where \( n \) is the number picked by the referee, \( a \) is the number given to Ann and \( b \) is the number given to Bob. Thus the set of states is:

```
1 1 3 3 5 5
0 2 2 4 4 6
2 0 4 2 6 4
```

(b) Ann only observes \( a \) and Bob only observes \( b \).
(c).

(d) At \( \begin{pmatrix} 5 \\ 6 \\ 4 \end{pmatrix} \) the smallest common knowledge event is \( \begin{pmatrix} 1 \\ 3 \\ 6 \\ 0 \\ 4 \\ 2 \\ 6 \end{pmatrix} \) which corresponds to “Ann’s number is either 2 or 6” and also “Bob’s number is either 0 or 4”.

(e) e.1) \( E = \begin{pmatrix} 1 \\ 3 \\ 2 \\ 2 \\ 3 \\ 4 \\ 2 \\ 6 \end{pmatrix} \). \( K_A E = \begin{pmatrix} 1 \\ 2 \\ 2 \\ 6 \end{pmatrix} \). \( K_B E = \begin{pmatrix} 1 \\ 0 \\ 4 \\ 2 \\ 2 \end{pmatrix} \). \( K_A K_B E = \begin{pmatrix} 1 \\ 0 \\ 4 \\ 2 \end{pmatrix} \).

\( K_B K_A E = \emptyset \).  

(e.2) There is only one such state \( \alpha \), namely \( \alpha = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} \).