1) Harrington 7.2
2) Harrington 7.1
3) Consider RPS with the following modified payoffs

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<thead>
<tr>
<th></th>
<th>R</th>
<th>P</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td>R</td>
<td>0,0</td>
<td>-2,2</td>
<td>1,-1</td>
</tr>
<tr>
<td>P</td>
<td>2,-2</td>
<td>0,0</td>
<td>-1,1</td>
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<tr>
<td>S</td>
<td>-1,1</td>
<td>1,-1</td>
<td>0,0</td>
</tr>
</tbody>
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Find all NE, both pure and mixed.

4) Harrington 8.5
5) Harrington 8.12
6) Consider the bargaining game we played in class on Nov 5. Recall that 2 players bargain for a “pie” of size 1. Player 1 gets to offer a sharing of the pie (x,1-x) meaning that player 1 would get fraction x and team 2 gets 1-x. Player 2 can then accept or reject the offer. If they reject the offer the game moves to round 2, but the value of the pie decreases by a factor of δ. In round 2, the second team gets to propose a sharing, and the 1st player then gets to decide to accept or reject. The process continues, with team 1 proposing in odd numbered rounds and team 2 in even numbered rounds, until an offer is accepted.

Consider the following strategy profile (s1*, s2*):

For both player i = 1 or 2:

i) If player i has an opportunity to make an offer, the offering player offers to keep the fraction:

\[
\frac{1}{1 + \delta}
\]

with the remaining fraction going to the opponent.

ii) If player i has an opportunity to accept an offer, he accepts if the share offered to him is at least

\[
\frac{\delta}{1 + \delta}
\]

(Both of the above are fractions of whatever amount of pie remains).

Note that the above is a full specification of the strategy profile because it specifies what each player does in each information set. This is a much more compact way to describe each player’s strategy than listing what they would do at each of the infinite number of decision nodes that can be reached!

a) Suppose the game somehow reaches round n, where n is odd. In round n and beyond player 2 plays the actions specified by s2* but player 1 deviates from s1* in round n and possibly the future...

   a-i) ... by proposing to keep less. Does 1’s payoff go up or down from what it would have been by playing s1*?

   a-ii) ... by proposing to keep more. Can 1’s payoff go up? (hint: Consider what offers player 2 will accept now or propose in the future. This will give you a maximum that 1 can hope to get no matter how 1 plays in the future)

b) Suppose the game somehow reaches round n, where n is even. In round n and beyond player 2 plays the actions specified by s2* but player 1 deviates from s1* in round n and possibly the future...

   b-i) ... by being willing to accept a smaller offer (than δ/(1+δ) ) from player 2. Does 1’s payoff go up or down?

   b-ii) ... only being willing to accept offers that are some amount more δ/(1+δ). (Consider what deals player 2 will accept anytime in the future)

c) Is s1* player 1’s best response to player 2 playing s2*?

d) Is (s1*, s2*) an SPE?