NOT TO BE TURNED IN. Answers will be posted around November 28.

1. Consider the two-player stage game with payoffs given in the usual format:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10, 10</td>
<td>0, 12</td>
</tr>
<tr>
<td>B</td>
<td>12, 0</td>
<td>9, 9</td>
</tr>
</tbody>
</table>

a. Find all pure Nash equilibria (NE) of the stage game. If none, explain why briefly.
b. Find all mixed NE of the stage game. If none, explain why briefly.
c. Suppose the stage game is repeated 3 times. How many strategies does the repeated game have? How many NE?
d. Now suppose the stage game is repeated 3,000,000 times. How many strategies does the repeated game have? How many NE?
e. Now suppose the stage game is repeated indefinitely. For what values of discount factor \( d \) is it a NE of the indefinitely repeated game for both players to use the “grim trigger” strategy GT = ‘play A until the other player plays B, then play B ever after’?
f. Suppose that the other player uses the strategy T4T = ‘play x in the current stage, where x is the action the other player chose in the previous stage, and x=A if there is no previous stage. For what values of d is it a best response for you to play B following a period in which the other player played x=B? For what values of d is it a best response for you to play A following a period in which the other player played x=A? When is it a NE of this repeated game for both players to play T4T?

2. Recall the time slot auction we used in class to allocate presentation slots between the 2 days:
   - Your bid is the percentage bonus of the project grade you require. (100 would be the maximum—you receive a perfect score on your entire project if you just show up the first day. 10 is a 10% boost to the project grade if you present early, 0 is no boost to presenting early.)
   - The nine lowest bidders will “win,” earn extra credit, and present on Tuesday.
   - All nine winning groups will earn the amount of extra credit of the lowest rejected bid, i.e., the tenth lowest bid = ninth highest bid.
   - Thus, if you win, you will earn more extra credit than what you bid!
   - The lower you bid, the better your chance of winning!

You know your own group’s break-even value \( v \) for extra credit for going early, but not the values (or bids) of the other groups. Find a Nash equilibrium bidding strategy profile for this game, making any necessary (but no unnecessary) assumptions about other teams’ values.
Hint: Make up a profile of other groups’ bids, and find your best response(s) \( b \) to that particular profile given your value \( v \). Then generalize to an arbitrary profile of others’ bids, and to an unknown profile.

3. Problem 1, Harrington Chapter 13, page 508
4. Problem 2, Harrington Chapter 14, page 549
5. Problem 3, Harrington Chapter 14, page 550

6. Drop in with other members of your group at least once prior to your presentation to chat with Dan or John during office hours about your group project.