This sheet contains a number of terms and practice problems that represent a rough approximation of questions I think could conceivably show up on an exam. There is no guarantee that anything on the exam will look exactly like anything here, but I expect that if you are able to solve all of these problems correctly and understand all of the problem sets, you will be fairly well prepared.

1 Conceptual Questions

a. What does it mean when we say that game theory assumes players are rational/behave rationally?

b. True or false: all subgame-perfect equilibria are also Nash equilibria. If true, explain why. If false, explain why not or provide a simple counter-example.

2 Normal Form Games

a. Find all pure strategy Nash equilibria of the following games.

   \[
   \begin{array}{ccc}
   & \text{Coke} & \text{Pepsi} \\
   \text{Regular} & 8.5 & 2.2 \\
   \text{Diet} & 5.1 & -2.4 \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & \text{Over} & \text{Under} \\
   \text{Over} & 2.2 & 2.2 \\
   \text{Under} & 2.2 & 1.1 \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & \text{Paper} & \text{Plastic} \\
   \text{Paper} & 4.4 & 1.3 \\
   \text{Plastic} & 3.1 & 2.2 \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & \text{Nash} & \text{Harsanyi} \\
   \text{Von Neumann} & 1.2 & 4.3 \\
   \text{Morganstern} & 5.7 & 0.4 \\
   \end{array}
   \]

b. Check for dominated strategies, and then solve for all equilibria (in pure or mixed strategies) for your answers to questions a, c, and d above.

c. Find all equilibria - mixed or pure strategy - of the following games.

   \[
   \begin{array}{ccc}
   & \text{Polisci} & \text{Econ} \\
   \text{Polisci} & 4.4 & 2.1 \\
   \text{Econ} & 1.2 & 3.3 \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & \text{Dayton} & \text{Mifflin} \\
   \text{Dayton} & -4.2 & -2.5 \\
   \text{Mifflin} & -1.4 & -3.1 \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & \text{IR} & \text{Theory} \\
   \text{Comparative} & 5.6 & 3.3 \\
   \text{American} & 2.3 & 4.0 \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & \text{Sweater} & \text{Vest} \\
   \text{Coat} & 0.4 & 3.3 \\
   \text{Tie} & 1.1 & 2.2 \\
   \end{array}
   \]
3 SPNE and Rollback

QUESTION A

France, Germany, and Hungary are the three members of a UN subcommittee charged with deciding whether to send peacekeepers to Sudan. Peacekeepers will be sent if (and only if) a majority of these three states vote in favor. All parties want peacekeepers to be sent to help the situation, but are wary of limited domestic political support and thus prefer to be on record in opposition. Each state’s preference ranking (higher numbers better) is as follows:

- Peacekeepers are sent and one’s own vote was against $4$
- Peacekeepers are sent and one’s own vote was in favor $3$
- Peacekeepers are not sent and one’s own vote was against $2$
- Peacekeepers are not sent and one’s own vote was in favor $1$

They vote in order: first France, then Germany, and finally Hungary. Construct a game tree and find the rollback equilibrium.

QUESTION B

Mali is considering whether to bring a complaint before the World Trade Organization’s Dispute Settlement Mechanism accusing the United States of unfair economic subsidies on cotton. The United States is deciding how to respond and whether to keep its subsidies.

Mali moves first, deciding whether or not to bring the complaint. If it chooses not to bring the complaint, the status quo remains in place. If it does bring a complaint, the United States then must decide how to respond. It can give in to Mali, voluntarily withdrawing its subsidies, or it can resist. If it resists, Mali must then decide whether to impose retaliatory trade barriers or not. The barriers, if imposed, are very costly for both Mali and the United States.

Write down the game tree for this game. Be sure to identify clearly all decision nodes, the player making the decision at that node, the choices available at those nodes, and the outcomes and payoffs at each terminal node.

What rankings of the outcomes for each player (payoffs) would you use to model this game and why? Choose values consistent with the description above, and explain them as briefly as possible. Do not include any ties within an actor’s preferences, and do not include any additional complexities that are not explicitly written in the above description.

Using these rankings, determine the rollback equilibrium of this game.

Is the equilibrium you identified subgame-perfect? Why or why not?