

Recitation One Problems

Problem One

Consider the set $X = \{G, R, M\}$.

- What is $X \times X$?
- Give a relation on X that is complete but not transitive.
- Give a relation on X that is transitive but not complete.
- Give a relation on X that is both transitive and complete.
- Write down two different utility functions that represent the preferences given in your answer to d.
- What are the strict preference and indifference relations that correspond to your answer to d?
- How many relations is it possible to define on X ?

Problem Two

Consider the following game with von Neumann-Morgenstern utilities:

| | | | |
|----------------------------------|-----|--------------------------|-------|
| | | $\overset{2}{L} \quad R$ | |
| | | L | R |
| $\overset{1}{U} \quad M \quad D$ | U | 3, 4 | 0, 0 |
| | M | 0, 0 | -2, 5 |
| | D | 1, 5 | 0, 3 |

- If player 1 is playing U , what is player 2's best action(s)? What if player 1 is playing M ? D ?
- If player 2 is playing L , what is player 1's best action(s)? What if player 2 is playing R ?
- Write down the set of players, each player's set of strategies, and the payoff function of each player.
- Does the following game have utility functions for both players that represent the same von Neumann-Morgenstern preferences as the original one?

| | | | |
|----------------------------------|-----|--------------------------|-------|
| | | $\overset{2}{L} \quad R$ | |
| | | L | R |
| $\overset{1}{U} \quad M \quad D$ | U | 5, -4 | 2, 0 |
| | M | 0, 0 | 0, -5 |
| | D | 3, -5 | 2, -3 |