

Econ 4020 – First Preliminary Exam Practice

There are 6 questions. You have 70 minutes to answer all of them.

Justify all your answers. Good luck!

1. What is your name?
2. What percentage grade from 0 to 100 do you think you will get on this exam?
3. Twenty three blue-eyed logicians and thirteen brown-eyed logicians are in a room. At the end of each day, those logicians who know for sure the color of their own eyes leave the room. Each logician can see the eyes of everyone else but not his own eyes. One day, a public announcement is made that “at least one logician in the room has blue eyes”.
 - (a) How many days pass after the announcement before the first logician leaves the room?
 - (b) How many days pass after the announcement before the last logician leaves the room?
4. Anna and Bob are each randomly dealt either a red or a black card facing down. Seeing the color of her own card but not that of Bob, Anna chooses whether to bet that the cards have the same color, or to fold. If Anna bets, Bob chooses whether to call Anna’s bet or to fold. The first player to fold pays \$1 to his/her opponent. If no player folds and both cards have the same color, Anna wins the bet and gets \$5 from Bob. Otherwise, Anna loses the bet and has to pay \$5 to Bob.
 - (a) Write down an extensive form game representing this situation.
 - (b) How many strategies does each player have?
 - (c) Write down a strategic form game representing this situation.
5. Suppose the central issue that will drive the outcome of an upcoming election is the new local tax rate. Four different rates are being considered: 1%, 1.25%, 1.5% and 1.75%. Each voter will vote for the candidate that proposes a rate closest to the one he or she prefers. There are 3600 people who want 1%, 200 that prefer 1.25%, 2400 that prefer 1.5%, and 1800 that prefer 1.75% (see the table). Suppose there are two candidates running for office, Mia and Nick, and they will propose a tax rate simultaneously and independently. The candidates do not care about tax rates, they simply want to maximize the number of votes they get.

<i>tax rate</i>	1%	1.25%	1.5%	1.75%
<i>voters</i>	3600	200	2400	1800

- (a) Write down a strategic form game that represents this situation from the perspective of the candidates.
- (b) Use iterated removal of dominated strategies to determine which strategies are rationalizable.
- 6.** Consider a strategic form game with players 1 and 2. Player 1 chooses $x \in [-2, 2]$ while player 2 chooses $y \in [0, 2]$. Payoffs are given by:

$$u_1(x, y) = \begin{cases} 1 & \text{if } 2|x| = y \\ 0 & \text{otherwise} \end{cases}$$

and

$$u_2(x, y) = y \left(2 + \frac{1}{2}x - y \right)$$

- (a) Suppose that player 1 believes that player 2 will choose $y = 2$. What are *all* of player 1's best responses to such beliefs?
- (b) Graph both players best responses as a function of their beliefs in a clearly labeled figure.
- (c) Find all dominated strategies for each player.
- (d) Is $y = 0$ rationalizable?
- (e) Find a rationalizable strategy for player 1.

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