

ECON 2200: Midterm

10/08/08, 10:00 – 1:00 p.m.

1. Consider the following normal form game, where player 1 chooses rows and player 2 chooses columns.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
<i>A</i>	2, 1	4, 2	1, 0	10, 3	2, 4
<i>B</i>	6, 10	2, 20	0, 10	7, 15	0, 18
<i>C</i>	5, 0	0, 0	3, 3	5, 0	0, 1
<i>D</i>	8, 1	2, 4	0, 0	5, 1	4, 2
<i>E</i>	1, 3	2, 6	0, 4	8, 5	1, 3

- (a) Does either player have any strictly dominated strategies? If so, what are they?
- (b) What strategies are eliminated through iterated deletion of strictly dominated strategies?
- (c) Find all pure strategy Nash equilibria of the game.
2. Consider the following normal form game, where player 1 chooses rows and player 2 chooses columns.

	<i>L</i>	<i>R</i>
<i>U</i>	<i>u, v</i>	<i>m, n</i>
<i>D</i>	<i>w, x</i>	<i>y, z</i>

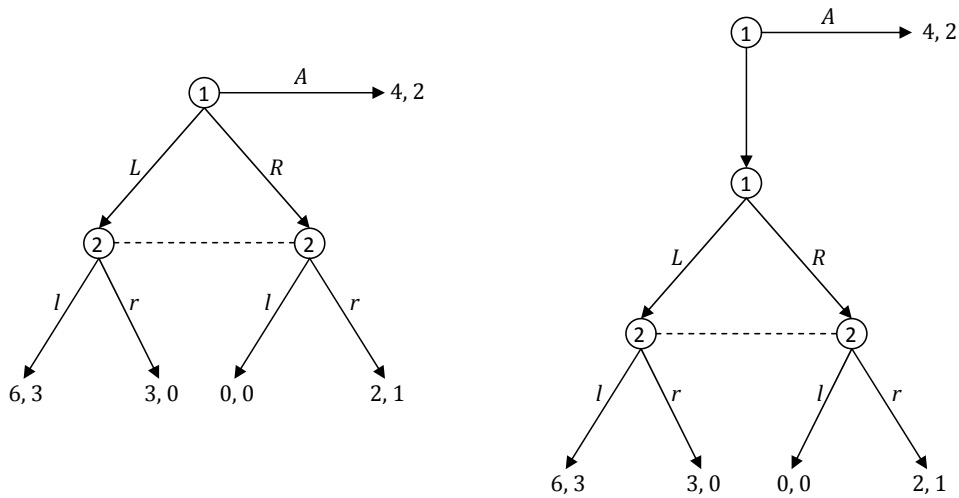
Suppose that $u > w$, $y > m$, $n > v$, and $x > z$.

- (a) Prove that this game has no pure strategy Nash equilibrium.
- (b) Solve for the mixed strategy Nash equilibrium in terms of the parameters.
3. Consider the following modified version of the battle-of-the-sexes game, where $\varepsilon_A \geq 0$ and $\varepsilon_B \geq 0$. Alice chooses the row and Bob chooses the column.

	Pub	Café
Pub	$1, 3 + \varepsilon$	$0, 0$
Café	$0, 0$	$3 + \varepsilon, 1$

- (a) Suppose ε_A and ε_B are common knowledge. Calculate the Nash equilibria of the game.
- (b) Suppose ε_A and ε_B are private information to Alice and Bob respectively, and that it is common knowledge that ε_A and ε_B are independently drawn from an identical uniform distribution on $[0, \bar{\varepsilon}]$. Find a Bayesian Nash equilibrium in which neither player simply ignores their private information.
- (c) What happens to this equilibrium as $\bar{\varepsilon} \rightarrow 0$? Comment briefly.

4. (a) Find all subgame perfect equilibria of the two games below.
 (b) Find all perfect Bayesian equilibria of the two games below.



5. Consider the following education signalling game:

- Nature chooses the worker's ability $a_L = 1$ or $a_H = 4$, with both types having equal probability.
- The worker observes his ability and chooses an education level $e \in \{0, 1\}$ (note: *only* these two values are allowed).
- The firms each offer a wage contract $w(e)$ (competition among firms implies zero expected profit).
- The worker accepts the best contract.

Payoffs are given by $\pi_w = w - 8\frac{e}{a}$ and $\pi_f = a - w$.

- (a) What are the perfect Bayesian equilibria of this game? What are the payoffs of the two types of worker in each equilibrium.
- (b) Which of these equilibria survive the intuitive criterion?
- (c) Repeat parts (a) and (b) with possible ability levels for the worker of $a_L = 1$ or $a_H = 5$.
- (d) Repeat parts (a) and (b) with the worker allowed to choose *any* education level $e \geq 0$.