

Answer all questions. **If you don't explain (= show your work for) your answers you will get no credit.**

**NAME:** \_\_\_\_\_ **University ID:** \_\_\_\_\_

**CIRCLE THE NAME OF YOUR TA: Kalyani Chaudhuri or Junghwan Ryu**

If you don't know the name of your TA, then write your Section Number: \_\_\_\_\_

- **By writing your name on this exam you certify that you have not violated the University's Code of Academic Contact** (for example, you have not copied from the work of another student and you have not knowingly facilitated cheating by another student).
- **If you submit the exam without writing your name and ID, you will get a score of 0 for this exam.**
- **If you do not stop writing when told so (at the end), a penalty of 10 points will be deducted from your score.**

1. [35 points] Consider the following game with ordinal payoffs ( $x$  and  $y$  can be any non-negative integers):

		Player 2		
		F	G	H
P l a y e r 1	A	2 , 4	2 , 3	0 , 3
	B	2 , 1	3 , 4	1 , 0
	C	3 , 2	4 , 2	2 , $y$
	D	$x$ , 3	3 , 4	1 , 4
	E	1 , 2	3 , 2	0 , 1

- (a) (a.1) [2 points] For what values of  $x$  does Player 1 have a **strictly dominant** strategy?
- (a.2) [2 points] Name the strategy.
- (b) (b.1) [2 points] For what values of  $x$  does Player 1 have a **weakly but not strictly dominant** strategy?
- (b.2) [2 points] Name the strategy.
- (c) [3 points] For what values of  $y$  does Player 2 have a **weakly dominant** strategy?
- (d) [6 points] For what values of  $x$  and  $y$  does the game have an **odd** number of pure-strategy Nash equilibria? Name the Nash equilibria.

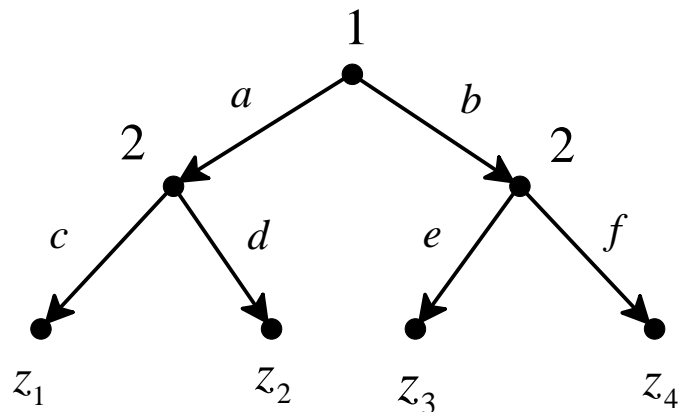
		Player 2		
		F	G	H
P l a y e r  1	A	2 , 4	2 , 3	0 , 3
	B	2 , 1	3 , 4	1 , 0
	C	3 , 2	4 , 2	2 , $y$
	D	$x$ , 3	3 , 4	1 , 4
	E	1 , 2	3 , 2	0 , 1

(e) [6 points] For what values of  $x$  and  $y$  does the game have an **even** number of pure-strategy Nash equilibria? Name the Nash equilibria.

(f) [6 points] For what values of  $x$  and  $y$  does the iterated deletion of **weakly** dominated strategies lead to two strategy profiles? Name the two profiles.

(g) [6 points] For what values of  $x$  and  $y$  does the iterated deletion of **weakly** dominated strategies lead to a unique strategy profile? Name the profile.

2. [26 points] Consider the following extensive-form game-frame with perfect information:



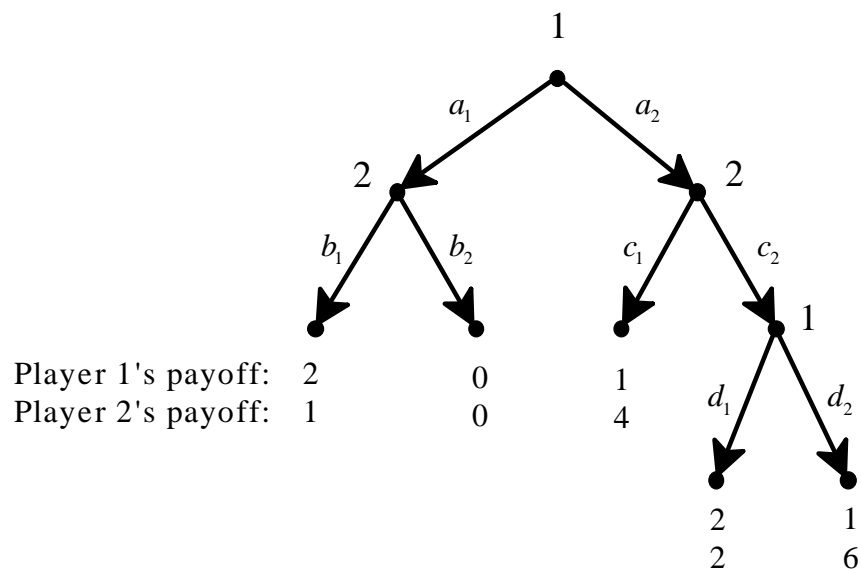
The players have complete and transitive preferences over the set of outcomes  $\{z_1, z_2, z_3, z_4\}$  and the preferences are such that the corresponding game has exactly three backward-induction solutions, namely  $(a, (c, e))$ ,  $(b, (c, e))$  and  $(b, (c, f))$ .

(a) [8 points] What can you infer about the preferences of Player 1?

(b) [8 points] What can you infer about the preferences of Player 2?

(c) [10 points] Write all the complete and transitive preference relations of **Player 1** that are compatible with the above information.

3. [27 points] Consider the following perfect-information game.



(a) [10 points] Write the corresponding strategic form.

(b) [10 points] List all the (pure-strategy) Nash equilibria.

(c) [7 points] Which of the Nash equilibria is also a backward induction solution?

**4.** [12 points] Consider the following two-player strategic-form game. Player 1 has five strategies: A, B, C, D and E and Player 2 has four strategies: f, g, h and k.

For Player 1:

- A is equivalent to B
- B strictly dominates C
- C is equivalent to D
- D weakly dominates E

For Player 2:

- f is equivalent to g
- g strictly dominates h
- h weakly dominates k

List all the pure-strategy Nash equilibria of this game.