

# ISCI 344 Game Theory

## IESDS Worksheet Solution

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- Outline:
- preference circles
  - use to find NE
  - use to simplify IESDS
  - find POs in reduced matrices

Preference circles:

- circle preferred payoff for each of the co-player's options
- $\bigcirc \rightarrow$  strict preference } unilateral
- $\odot \rightarrow$  weak preference }
- outcome preferred by both players  $\rightarrow$  NE

$\bigcirc \bigcirc = \text{SNE}$

$\left. \begin{array}{l} \bigcirc \odot \\ \odot \bigcirc \\ \odot \odot \end{array} \right\} = \text{WNE}$

My name: \_\_\_\_\_

**ISCI 344 "Game Theory"**  
**In-class Worksheet –IESDS**

Let's practice some of the solution concepts we learned about for payoff matrices (normal form games). In particular, let's apply:

- Iterated Elimination of Strictly Dominated Strategies (IESDS)
- Nash equilibria
- Pareto improvement and Pareto optimality

For each of the following matrices,

1. Apply IESDS to simplify the matrix as much as possible.
2. Find all Nash equilibria (strict and weak)
3. Looking at the full matrix, are there any outcomes that would be mutually preferred over the Nash equilibria? (Pareto improvements?) You are not required to find all Pareto optima in the full matrix.
4. What strategy would you play if you were the row player, and why? Column player?

(a)

	C1	C2	C3
R1	1, 0	-2, -1	0, 1
R2	1, 2	-5, -1	0, 0

Handwritten annotations: C2 is crossed out with a blue X. R1C1 (1,0) is circled in red. R1C3 (0,1) is circled in blue and labeled "WNE". R2C1 (1,2) is circled in blue and labeled "Po". R2C2 (-5,-1) is circled in red and labeled "WNE".

(b)

	N	C	J
N	73, 25	57, 42	60, 32
C	80, 26	35, 12	32, 54
J	28, 27	63, 31	54, 29

Handwritten annotations: N and J columns are crossed out with blue X's. N and C rows are crossed out with red X's. C2C1 (80,26) is circled in red. C2C2 (35,12) is circled in blue. C2C3 (63,31) is circled in blue and labeled "P". C3C3 (54,29) is circled in blue and labeled "SNE".

(c)

	a	b	c
A	1, 1	-2, 0	4, -1
B	0, 3	3, 1	5, 4
C	1, 5	4, 2	6, 2

Handwritten annotations: b and c columns are crossed out with blue X's. A row is crossed out with a red X. C1C1 (1,1) is circled in red and labeled "w". C1C3 (1,5) is circled in blue and labeled "P". C2C3 (4,2) is circled in red. C3C3 (6,2) is circled in blue.

My name: \_\_\_\_\_

(d)

	a	b	c	d	e
A	63, -1	28, -1	-2, 0	2, 45	-3, 19
B	32, 1	2, 2	2, 5	33, 0	2, 3
C	54, 1	95, -1	0, 2	4, 1	0, 4
D	1, -33	-3, 43	-1, 39	1, -12	-1, 17
E	-22, 0	1, -13	-1, 88	-2, 57	-3, 72

(e)

	a	b	c	d	e	f	g	h
A	-1, 1	-1, 1	-1, 1	-1, 1	1, -1	1, -1	1, -1	1, -1
B	1, -1	0, 0	1, -1	0, 0	1, -1	0, 0	1, -1	0, 0
C	-1, 1	-1, 1	0, 0	0, 0	-1, 1	-1, 1	0, 0	0, 0

(f)

	0	1	2	3	4	5
0	4, 5	4, 14	4, 13	4, 12	4, 11	4, 10
1	13, 5	3, 4	3, 13	3, 12	3, 11	3, 10
2	12, 5	12, 4	2, 3	2, 12	2, 11	2, 10
3	11, 5	11, 4	11, 3	1, 2	1, 11	1, 10
4	10, 5	10, 4	10, 3	10, 2	0, 1	0, 10