

Solution 1. First, make a table of all possible outcomes. Player 1 is rows, Player 2 columns.

	\$1	\$2	\$3	\$4	\$5
\$1	(1, \$1)	(2, \$1)	(2, \$1)	(2, \$1)	(2, \$1)
\$2	(1, \$1)	(1, \$2)	(2, \$2)	(2, \$2)	(2, \$2)
\$3	(1, \$1)	(1, \$2)	(1, \$3)	(2, \$3)	(2, \$3)
\$4	(1, \$1)	(1, \$2)	(1, \$3)	(1, \$4)	(2, \$4)
\$5	(1, \$1)	(1, \$2)	(1, \$3)	(1, \$4)	(1, \$5)

Translate outcomes into preferences (top) and then assign utilities (bottom).

$$\begin{aligned}
 (1, \$1) \succ_1 (1, \$2) \succ_1 (2, \$4) \succ_1 (2, \$3) \succ_1 (2, \$2) \succ_1 (2, \$1) \sim_1 (1, \$3) \succ_1 (1, \$4) \succ_1 (1, \$5), \\
 (2, \$1) \succ_2 (2, \$2) \succ_2 (2, \$3) \succ_2 (2, \$4) \succ_2 (1, \$5) \succ_2 (1, \$4) \succ_2 (1, \$3) \succ_2 (1, \$2) \succ_2 (1, \$1).
 \end{aligned}$$

The payoff matrix is

	\$1	\$2	\$3	\$4	\$5
\$1	8, 1	3, 9	3, 9	3, 9	3, 9
\$2	8, 1	7, 2	4, 8	4, 8	4, 8
\$3	8, 1	7, 2	3, 3	5, 7	5, 7
\$4	8, 1	7, 2	3, 3	2, 4	6, 6
\$5	8, 1	7, 2	3, 3	2, 4	1, 5

The Nash equilibria are (\$2, \$3), (\$3, \$4), and (\$4, \$5).

- **ordinal:** utilities represent nothing but rankings; twice as much utility does *not* mean twice as good of an outcome.
- **strategic form:** intuitively, everyone acts at “same time” and thus can be expressed as a table of preference-ordered outcomes
- **reduced form:** replacing rankings with utilities; “reduced” refers to loss of information from dropping outcomes.
- **best-response correspondence:** tells you the best strategy for Player i to take based on whatever Player $-i$ does.

Solution 2. Identify all weakly dominated strategies. (Note that all strictly dominated strategies are also weakly dominated.)

For Player 1,

\$1 dominated by \$2, \$5 is dominated by \$2

For Player 2,

\$1 dominated by \$2, \$2 dominated by \$3, \$3 dominated by \$4, \$4 dominated by \$5

Delete all of these dominated strategies for step 1 to get the new payoff matrix

	\$5
\$2	4, 8
\$3	5, 7
\$4	6 , 6

Now for Player 1, \$4 dominates both \$2 and \$3, so delete those for step 2. We are left with unique IDWDS equilibrium (\$4, \$5).

Comments

- IDSDS will never delete a Nash equilibrium. Therefore if there is a unique IDSDS solution, then it will be the unique Nash equilibrium.
- IDWDS will sometimes delete a Nash equilibrium. But if there is a unique IDWDS solution, then it will be a Nash equilibrium.
- If the procedure does not lead to a single strategy profile, then we refer to the result as the *output* instead of the equilibrium.

As an example of the third bullet point, the IDSDS procedure stops at

	\$3	\$4	\$5
\$2	4 , 8	4, 8	4, 8
\$3	3, 3	5 , 7	5, 7
\$4	3, 3	2, 4	6 , 6

At this point, there are no strictly dominated strategies to delete. This should not be surprising, because each row and each column contains a Nash equilibrium, and the IDSDS will never delete a Nash equilibrium. Therefore, no IDSDS equilibrium exists.