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

		\$2			
\$1	(1,\$1)	(2, \$1) (1, \$2) (1, \$2) (1, \$2) (1, \$2)	(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).

$$(1,\$1) \succ_{1} (1,\$2) \succ_{1} (2,\$4) \succ_{1} (2,\$3) \succ_{1} (2,\$2) \succ_{1} (2,\$1) \sim_{1} (1,\$3) \succ_{1} (1,\$4) \succ_{1} (1,\$5),$$

$$(2,\$1) \succ_{2} (2,\$2) \succ_{2} (2,\$3) \succ_{2} (2,\$4) \succ_{2} (1,\$5) \succ_{2} (1,\$4) \succ_{2} (1,\$3) \succ_{2} (1,\$2) \succ_{2} (1,\$1).$$

The payoff matrix is

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

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), which is also a Nash equilibrium; not a coincidence.

Comments

- IDSDS will never delete a Nash equilibrium. Therefore if there is a unique IDSDS equilibrium, then it will be the unique Nash equilibrium.
- IDWDS will sometimes delete a Nash equilibrium. But if there is a unique IDWDS equilibrium, 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

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.