

EconS 503 - Microeconomic Theory II
 Homework #1 - Due date: Friday, January 18th, in class.

1. Consider the 3x3 matrix at the bottom of page 72 in Tadelis.
 - (a) Find the strict dominant equilibrium of this game.
 - (b) Which strategy profile/s survive IDSDS?
 - (c) Which strategy profile/s survive rationalizability?

2. **[Two short proofs]** Prove the following claims:
 - (a) If a strategy profile is a Nash equilibrium of a N -player game, it must also survive rationalizability.
 - (b) The converse of (a) is not necessarily true. (For this part, an example suffices.)

3. **[IDWDS and Sophisticated equilibrium]** Consider a game with N players, where player i 's strategy space is denoted as S_i . Assume that the game is solvable by IDWDS, yielding the surviving strategy set S_i^{Sur} for each player i , that is, $S_i^{Sur} \subset S_i$. Therefore, the strategy profile surviving IDWDS is denoted as the Cartesian product of surviving strategy sets $s^{Sur} \in S_1^{Sur} \times \dots \times S_N^{Sur}$.

We say that strategy profile surviving IDWDS, s^{Sur} , is a “*sophisticated equilibrium*” if every player i is indifferent between any two of his surviving strategies s_i and s'_i , that is,

$$u_i(s_i, s_{-i}) = u_i(s'_i, s_{-i}) \text{ for every } s_i, s'_i \in S_i^{Sur} \text{ and all } s_{-i} \in S_{-i}.$$

Consider the following normal-form game.

		Player 2		
		L	M	R
Player 1	U	5, 4	5, 4	9, 0
	C	1, 7	2, 5	8, 6
	D	2, 3	1, 4	8, 3

Find the set of strategy profiles surviving IDWDS. Can you identify any sophisticated equilibria?

4. **[A generalized Battle of the Sexes]** Consider the following, more general, version of the Battle of the Sexes game:

		$Wife$	
		$Football$	$Opera$
$Husband$	$Football$	$h + t, t$	$0, w$
	$Opera$	$h, 0$	$t, w + t$

where h (w) denotes the husband's (wife's) payoff from being at his (her) most preferred event, relative to his (her) less preferred event, regardless of whether his (her) spouse attends that event too. Parameter t represents the payoff he (she) obtains when attending the same event as his (her) spouse. For simplicity, assume that all three parameters are positive, $h, w, t > 0$.

- (a) Can you find any strictly dominated strategies for either player? Does your result depend on parameter values?
- (b) What strategy profile survives IDSDS?
- (c) Find the Nash equilibrium of the game when players are restricted to use pure strategies.