

EconS 503 - Microeconomic Theory II
Homework #1 - Due date: Monday, February 8th, in class.

1. Exercise 2, chapter 8, in FMG (Advanced Microeconomic Theory, MIT Press).
2. **Strict dominant equilibrium and IDSDS.** A strategy profile $s^{SD} = (s_1^{SD}, \dots, s_N^{SD})$ is a strictly dominant strategy equilibrium if s_i^{SD} is strictly dominant for every player $i \in N$, that is,

$$u_i(s_i^{SD}, s_{-i}) > u_i(s_i, s_{-i}) \quad \text{for all } s_i \neq s_i^{SD} \quad \text{and for all } s_{-i} \in S_{-i}.$$

- (a) Show that if strategy profile s^{SD} is a strictly dominant equilibrium, then it must be unique. [*Hint*: Use contradiction, by considering another strictly dominant equilibrium.]
 - (b) Show that if strategy profile s^{SD} is a strictly dominant equilibrium, then it must be the only strategy profile surviving the iterative deletion of strictly dominated strategies (IDSDS).
 - (c) Show that if a strategy profile is the only one surviving IDSDS, it does not need to coincide with the strict dominant equilibrium. [*Hint*: An example suffices, where you provide a game where the strict dominant equilibrium does not exist.]
3. **IDSDS implies IDWDS.** Show that if a strategy profile $s = (s_1, s_2, \dots, s_N)$ survives IDWDS, it must also survive IDSDS. [*Hint*: Use contradiction, by considering a strategy profile that, despite surviving IDWDS, violates IDSDS.]
 4. **IDWDS does not implies IDSDS.** Show that if a strategy profile $s = (s_1, s_2, \dots, s_N)$ survives IDSDS, it does not need to survive IDWDS. (An example suffices.)
 5. **Exercises 7.8 from Jehle and Reny's Advanced Microeconomic Theory book.** (see page 365 in new edition).
 6. **Exercises from Tadelis:**
 - (a) Chapter 4: Exercise 4.3.
 - (b) Chapter 5: Exercises 5.1 and 5.9.