CS4261/5461: Assignment for Week 1

Due: Sunday, 24th Aug 2025, 11:59 pm SGT.

Please upload PDFs containing your solutions (hand-written & scanned, or typed) by 24th Aug, 11:59 pm to `Assignments/Assignment1/Submissions`. Name the file **Assignment1_SID.pdf**, where SID should be replaced by your student ID.

You may discuss the problems with your classmates or read material online, but you should write up your solutions on your own. Please note the names of your collaborators or online sources in your submission; failure to do so would be considered plagiarism.

Note: For this assignment, justification is required only for Questions 1(c) and 2.

1. (7 points, graded for correctness) Carla and Don are deciding what to do this weekend. Each of them can play either tennis or basketball.

   - If both of them play tennis, Carla gets a payoff of 7 and Don gets a payoff of 3.
   - If both of them play basketball, Carla gets a payoff of 3 and Don gets a payoff of 7.
   - If they play different sports, each of them gets a payoff of 1.

   (a) (1 point) Write this game as a normal-form game.

   (b) (2 points) Determine all pure Nash equilibria of this game.

   (c) (4 points) Determine, with justification, all Nash equilibria of this game. (Don't forget to include the pure Nash equilibria found in part (b), if necessary.)

2. (1 point) Determine, with justification, all Nash equilibria of the following game.

	L	M	R
T	1,6	1,0	2,7
C	2,4	2,2	0,3
B	2,3	1,4	8,2

3. (1 point) Answer either "Yes" or "No" to each of the following questions. Does there exist a two-player game, with two actions for each player, that has ...

   (a) ... no pure Nash equilibrium?

   (b) ... no Nash equilibrium at all (whether pure or not)?

   (c) ... exactly two Nash equilibria (whether pure or not)?