CS4261/5461: Assignment for Week 2

Due: Sunday, 31st Aug 2025, 11:59 pm SGT.

Please upload PDFs containing your solutions (hand-written & scanned, or typed) by 31st Aug, 11:59 pm to `Assignments/Assignment2/Submissions`. Name the file **Assignment2_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 and 2.

1. (7 points, graded for correctness) Consider the following game.

	W	X	Y	Z
A	$8, 6$	$1, 6$	$2, 7$	$6, 4$
B	$2, 4$	$5, 5$	$4, 5$	$7, 4$
C	$0, 2$	$5, 2$	$3, 6$	$6, 3$
D	$3, 5$	$4, 6$	$3, 5$	$0, 4$

   (a) (3 points) Which of the eight actions A, B, C, D, W, X, Y, Z are **strictly** dominated (in the original game)? Specify all such actions.

   (b) (4 points) Determine, with justification, all Nash equilibria of this game.

2. (1 point) Consider the following game, where t is a (not necessarily positive) real number.

	L	R
T	$1, 2$	$2, 3$
B	$1, 0$	$t, 0$

   (a) Determine all values of t such that the game has exactly two **pure** Nash equilibria.

   (b) Determine all values of t such that the game has exactly two Nash equilibria **overall**.

3. (1 point) Consider a two-player game, with actions T and B for the row player and L and R for the column player. Answer either "True" or "False" to each of the following questions.

   (a) If (T, L) and (B, R) are Nash equilibria, then so are (T, R) and (B, L).

   (b) Suppose that playing T yields at least as high payoff to the row player as playing B when the column player plays L, and strictly higher payoff when the column player plays R. Then B is played with zero probability in every Nash equilibrium.

   (c) Suppose that playing T is a best response of the row player to the column player playing $\frac{1}{3}L + \frac{2}{3}R$, and so is playing B. Then so too is playing $\frac{3}{4}T + \frac{1}{4}B$.