STALGCM Problem Set #2

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- Release date: March 17, 2025
- Due date: March 29, 2025, 12:00 NN
- Total points: 50 points

REMINDER: READ BEFORE YOU START ANSWERING

1. This is an open notes problem set. You may refer to any material online for reference.
2. This problem set is worth 50 points.
3. This problem set may be done in groups of three, pairs or solo.
4. Clearly label each answer with the test and item number.
5. Clearly indicate the final answer for each item (you may box the final answer to indicate it when applicable).
6. For questions that require you to explain, you may use Filipino and/or English.
7. When asked to design a machine, provide the state diagram.
8. Cheating in any form is punishable with a grade of 0.0 for the course and a disciplinary offense.

Provide the following information: Group name, members, section, group number and BGA ID. Example:

Members	Section	Group number	BGA ID
John Doe	S12	#21	Muriel9090
Jane Doe	S13	#23	Crunch2104
No Wear	S13	#23	Point5678

Group name: Kikiang-kiang

Additional reminders: Intra-section groups must use groups 1 to 20 while inter-section groups must use groups 21 to 30. Inter-section groups do not need to have the same group number across sections. Compile your answers in a pdf file. For inter-section groups, each subgroup per section must upload a copy of the answers.

1. (20 points + 1 point bonus) Model the turn-based mechanics and key events of the board game 6 nimmt! using a PDA. This will involve identifying states, transitions and symbols based on the rules of the game. Play at least one full game of the online version (https://en.boardgamearena.com/gamepanel?game=sechsnimmt) with the default setup. For solo players, you are allowed to play with other individuals (indicate whether they are relatives, non-DLSU friends, DLSU students, or DLSU personnel).
    a. (1 point bonus) Provide a screenshot of the final game result.
    b. (4 points) From which perspective—one player, all players, or a spectator—can we represent a full game using a 1-stack PDA? Choose at least one and explain your answer. Assume that a game has at least three players.
    c. (8 points) If a full game will be expressed using a 1-stack PDA, what are your input symbols and stack symbols? Explain your answer and provide sample transitions (showing scan, push and pop).
        i. Example: The input symbols represent the player IDs while the stack symbols represent the player ratings because <explanation>.
    d. (4 points) If another stack will be introduced, how will you use the first stack and how will you use the second stack?
        i. Example: The first stack tracks the player ratings while the second stack tracks the player's IDs.
    e. (4 points) If you have the power to change the data structure used by the PDA, which data structure will you use and why?
2. (15 points) Using the convention discussed in class (operations Scan, Push, Pop), design a PDA that accepts strings where the number of English words (e) is equal to the number of Filipino words (f). The input can be an empty string.
3. (15 points) Design a Turing machine that converts all English inputs (e) to 0 and all Filipino inputs (f) to 1 if the number of English inputs (e) is even. If it is odd, convert all English inputs (e) to 1 and all Filipino inputs (f) to 0. Assume that the input contains at least one character.