AMERICAN UNIVERSITY OF ARMENIA
College of Science and Engineering
CS 339 Quantum Computing
Final Project – Quantum Master Mind

Required Preliminary Submission Deadlines:	Monday, May 06 2024, before 11:30 am
Submission Format:	electronically to skhachat@aua.am
Final Submission Deadlines:	Saturday, May 11 2024, before 11:59 pm
Submission Format:	electronically to skhachat@aua.am

Consider the famous puzzle game Master Mind played by two players (see **Master_Mind_Report.pdf**). Given *n* different colors, the first player – the keeper, secretly forms a sequence of *n* colored pins, where several pins may share the same color, or all of them may be of different colors. The task of the second player – the guesser, to disclose the hidden sequence with minimal guesses. Work on any of the following two versions:

- **Version 1**: each guess is graded by the keeper with two digits – the first being the number of correct pins in their correct positions and the second being the number of pins with correct colors but in wrong places. The game stops when the grade of the most recent guess is *n*0.
- **Version 2**: each guess is graded by the keeper with a single digit – the number of correct pins in their correct positions. The game stops when the grade of the most recent guess is *n*.

1. Create a repository to upload all project deliverables. Share it with skhachat@aua.am not later than the preliminary submission deadline.
2. Estimate the complexity of the move search in different stages of the game.
3. Suggest a system of qubits that describes the game, and define the game states and state vectors.
4. Design quantum gates that implement the operations of the sequential classical algorithm.
5. Apply the designed gates to superposition states aiming at parallelization of the move search.