

Master Mind

1 Project Description

For this project, you are to create a software version of the game *Master Mind* (rules of which are described in the succeeding sections). This is a two-player game, where the players take turns in guessing the secret code generated by the computer. The secret code is a four-digit number, and this digits in this number are 1 to 9 only.

The players take turn in guessing the secret code. Each guess is in the form of **one four-digit integer**. The guess entries of each player is displayed in the *guess column* of the game screen. After the player enters his guess, the computer gives a score to this entry.

2 Rules

1. The secret code generated by the computer is a four-digit number. This number may only contain digits from 1 to 9.
2. When the user enters his guess, it must be a four-digit number with digits 1 to 9 only.
3. After every guess, the computer displays the score for this entry.
4. Game ends when the maximum number of guesses is reached, or when a player successfully guesses the secret code.

3 Scoring

After a player enters his guess, the computer determines the score of this guess. The score has two parts:

- **The number of exact matches.** This is the number of digits that are in the correct position. A score of 4 here means that the guess matches the secret code.
- **The number of correct digits.** This is the number of correct digits, but are not in their correct positions. A score of 4 here means that the guess contains all the correct digits but are not in their correct positions, thus still does not match the secret code.

The range of the sum of the two results above is $[0, 4]$

4 The Software

The software must include the following:

Main Screen The user is allowed to navigate around the software. At the least, the following options must be present: New Game, Settings, Exit.

New Game At the start of each game, the computer randomly generates a secret code. The game screen¹ displays each players guesses and scores for each guess. Players take turn in entering their guesses. The game ends when either one of the user made a correct guess. **You are required to add a Reveal option to show the secret sequence without interrupting the current game.**

Settings In this option, the user may

- define the maximum number of guesses that is allowed for each player. The default number of guesses is set to 10.
- (*optional*) define the number of players for the next game. The default is set to 2.
- (*optional, if colored pegs are used*) redefine the assigned digits for each color.

Exit The program terminates. It is only in this option that the user can exit the program.

¹Game screen is divided into two parts, one for each player. Each part is further divided into *guess column* and *score column*.

Result Screen Before returning to the main menu, a result screen must be shown. When a player made a correct guess, a *win* screen with the player number, the secret code, and the number of guesses made must be shown. If both players have reached the maximum number of guesses and were not able to guess the sequence correctly, a *draw* screen with the secret code must be shown.

5 Bonus

You may earn bonus points for this project if the minimum requirement (as discussed above), and instead of displaying the guesses as numbers, they are displayed as colored pegs. Note that each user guess is still entered as an integer. The computer displays this integer as four pegs of colors in one row of the *guess column* of the game screen.

For the score of each guess, black and white pegs will be used. The number of black pegs displayed represents the number of exact matches; and the number of white pegs displayed represents the number of correct digits. If the score is 0 for both, no pegs will be displayed.

6 Requirement

1. The project must be submitted **on or before December 7, 2019 (Sa)** via upload in Canvas. The timestamp of submission entry in Canvas will be used to determine submission time.
2. All projects submitted on time will be compiled first, and only projects that compiled with no warnings and errors will be checked and graded.