

**EECE3326, Optimization Methods**  
Department of Electrical and Computer Engineering

**Project #1**

In this project, you will write a complete program that allows the user to play a game of Mastermind against the computer. A Mastermind game has the following steps:

1. The user is prompted to enter two integers: the code length  $n$ , and the range of digits  $m$ .
2. The computer selects a code: A random sequence of  $n$  digits, each of which is in the range  $[0, m-1]$ .
3. The user is prompted to enter a guess, an  $n$ -digit sequence.
4. The computer responds by printing two values that indicate how close the guess is to the code. The first response value is the number of digits that are the right digit in the right location. The second response value is the number of digits that are the right digit in the wrong location.

For example if the code is 1, 2, 3, 4, 5 and the guess is 5, 0, 3, 2, 6, the response would be 1, 2 because one digit (3) is the right digit in the right location, and two digits (2 and 5) are the right digits in the wrong locations.

Note that no digit in the code or guess is counted more than once. If the code is 1, 2, 3, 4, 5 and the guess is 2, 1, 2, 2, 2, the response is 0, 2. If the code is 3, 2, 3, 3, 3 and the guess is 1, 3, 3, 4, 5, the response is 1, 1.

5. The user is prompted to continue entering guesses. The user wins if the correct code is guessed. The user loses if a predetermined maximum number of guesses has been made.

Your program should be modular and should make full use of object-oriented programming techniques. Each class should clearly separate its interface from its implementation. Use member functions to implement all commonly used operations.

**Part a**

In the first part of the project, implement the class `code` which stores the code as a vector. No error-checking is necessary. Implement:

1. The `code` class declaration,
2. a constructor that is passed values  $n$  and  $m$  and which initializes the random code,
3. a function `checkCorrect` which is passed a guess as a parameter and which returns the number of correct digits in the correct location,
4. a function `main` which initializes a code and prints out the result of calling `checkCorrect` for three sample inputs.