

INTRODUCTION TO COMPUTER SCIENCE I

PROJECT 3

Mastermind!

Note the updated due-date!

For this assignment, you must implement the game of Mastermind. Below, we'll describe the rules of this game, and then the interface that we expect your program to use.

1 The game

Here are the **rules of the game**:

- There are a *player* and an *adversary*. For this assignment, the computer will be the adversary, and the user will be the player.
- The game begins with adversary choosing, and keeping secret, a **sequence of four** pegs. These pegs come in six colors:
 - Blue
 - White
 - Green
 - Yellow
 - Orange
 - Red
- The player must try to guess the sequence of peg colors select by the adversary, in the following manner:
 1. The player selects a sequence of four pegs.
 2. The player submits this sequence to the adversary as a guess.
 3. The adversary determines how many pegs from the guess are of the correct color and in the correct position in the sequence.
 4. The adversary uses red and white markers to tell the player how good the guess was. For every peg in the player's guess that was the correct color and in the correct place, the adversary gives the user one black peg. For every peg that was the correct color but not in the correct place, the adversary gives the player one white peg.
 5. If the guess is completely correct (all four pegs of the correct color, and in the correct places in the adversary's sequence), then the game is over, and the player wins.
 6. Otherwise, if the player has submitted 10 guesses without winning, then the game is over, and the adversary wins.
 7. Otherwise, the player guesses again, starting at step 1.

2 The interface

Since we are using only a text interface, we must choose characters that represent the colored pegs and the colored markers. The colors of the pegs will be designated by the first letter of the color, like so:

- b = Blue
- w = White
- g = Green
- y = Yellow
- o = Orange
- r = Red

So, a sequence "bbyr" represents a peg sequence of *blue, blue, yellow, red*.

We must also choose characters to represent the markers that the adversary uses to communicate with the player. Your adversary should respond with:

- c = Correct (both color and position in the sequence)
- m = Misplaced (correct color, wrong position in the sequence)

An example:

- Imagine that the adversary picks the sequence "bbyr".
- The player then guesses "ybrg".
- The blue peg is the correct color, and in the correct position.
- The yellow and red pegs are the correct colors, but in the wrong position.
- The green peg is not even the right color.
- The adversary responds to the player by printing, "cmm", indicating that one peg was of the correct color and in the correct place, and two other pegs were the correct color and in the wrong place.

3 Your assignment

Write a program that plays the game of Mastermind. The computer should randomly select the sequence of four pegs from the possible six colors, and then allow the user/player as many as 10 guesses. When the game is over, the program should indicate whether the player or the adversary won.

A key part of this assignment is to write the program as a group of functions that call one another. Indeed, your program **must contain a `main()` function** that is called as the starting point of the program, the rest of which is also contained in functions. Here are some suggestions for functions that you might want to write for this program:

- A function that randomly selects one of the four peg colors and returns the character for that color (e.g., `b` for *blue*).
- A function that randomly selects a sequence of four peg colors.
- A function that gets a sequence of four peg colors from the user.
- A function that determines how many pegs in the user's guess are the right color and in the correct position.
- A function that determines how many pegs in the user's guess are the right color and in the incorrect position.
- A function that prints, using the marker characters, the correctness of the user's guess.

There may be more functions that you choose to write!

4 Submitting your work

On the CS submission site, upload your module, which I expect will be named `mastermind.py`.

Extended deadline: This assignment is due by Wednesday, Oct-15, at 1:00 pm.