ES112.02/04
Fall 2003-2004 Term Project
Project #2: "Mastermind"

1 The Project

The purpose of this project is to write a C program that will implement the well-known (perhaps not by you!) Mastermind game. However, unlike the usual case, the point here is to make the *computer* the guessing side ("player") rather than the user.

2 The Description of the Mastermind Game

The game called Mastermind is a boxed game, which is played using colored pegs (of six different colors). One player chooses four pegs, and places them behind a screen where the other player can not see. The second player then guesses what is behind the screen, by placing four pegs of any colors he chooses on the playing area. The first player then provides feedback, using another set of special black/white pegs, placing one black peg for each guess that is of correct color *and* in the correct place, and one white peg for each peg of correct color, but in the wrong place. Then the second player makes another guess, until he guesses correctly using the feedback provided by the first player.

Since colors are difficult to use on a computer, we will instead use the following alternative game with numbers rather than colors.

Player A chooses a four-digit number, consisting of the digits 1, 2, 3, 4, 5 and 6. Repetitions are allowed. Then, player B makes a four-digit guess in the same way. Player A announces the score, giving 10 points for each digit that is correctly in place, and 1 point for each digit that exists in the actual number, but is in the wrong place.

One sample game would be as follows:

```
Number :   2426

           Guess  Score
           -----  -----
            1122     11
            3344      1
            1155      0
            2236     21
            2246     22
            2426     40
```

Note that the sum of the digits of the score gives the total number of correct digits, in place or not. Also note that, in the second guess, there are two 4's in the wrong places, but the score is just 1 because there is only a single 4 in the actual number.

3 Project Requirements

The goal of this project is to make the computer play the game of mastermind as player B. The user will pick a four-digit number (and hopefully write it down). Then the computer will print its guess, and ask the user for the score of the guess. Once the score entered is 40, the game should end, the number of total guesses should be printed, and the program should exit.

Note that it is possible for the user to enter inconsistent scores, making it impossible for the computer to find the number. This possibility should also be detected and reported, at which point the program should also terminate.

3.1 Sample Runs

Here are two sample runs. In the first one, the user has picked 2426.

```
Pick a four digit number, using digits from 1 to 6.

My guess is: 1122
Enter the score for this guess: 11

My guess is: 3344
Enter the score for this guess: 1

My guess is: 1155
Enter the score for this guess: 0

My guess is: 2236
Enter the score for this guess: 21

My guess is: 2246
Enter the score for this guess: 22

My guess is: 2426
Enter the score for this guess: 40

I got your number in 6 guesses.
```

In this second one, the user is just being evil. No number is picked.

```
Pick a four digit number, using digits from 1 to 6.

My guess is: 1122
Enter the score for this guess: 0

My guess is: 3344
Enter the score for this guess: 0

My guess is: 5566
Enter the score for this guess: 0

Your scores are inconsistent. You are cheating.
Game terminated after 3 guesses.
```

3.2 Important Points

The computer should guess in a random, but smart fashion. The above are only examples, not how exactly things should run. However, guessing all possibilities one by one is not an acceptable solution. In general, playing more-or-less intelligently, the computer should get the number on the average in 6-7 tries.