ENCMP 100 – Computer Programming for Engineers
Assignment #4
Due: Monday, Mar. 20 2017 at 6:00pm MST

Objective

This assignment is designed to provide you with practice using functions/sub-functions to perform computations. You will also practice using repetition/loops, selections, and formatting outputs. You will develop a MATLAB program that utilizes functions/sub-functions to summarize medal standings from the Winter Olympics based on results from individual sports.

Marking Scheme

You will get a total of 50 points for completing the following:

TASK	POINTS
Part A -Use and design of function and sub-functions with correct displayed outputs	20
Part B - Further testing of your solution with an alternative olympics.mat file	15
Quality of code	15
TOTAL	50

Points for Quality of Code

- Complete file header – 3 points
- Design (appropriate use and naming of variables) – 5 points
- Comments in the code – 5 points
- Layout (indentation/spacing) – 2 points

Submission

- Filename for this assignment: Assign4_<UofA_ID_Number>.m. For example, for a U of A ID Number: 1234567, the filename for assignment #4 is Assign4_1234567.m
- Submit only your **.m** file under Assignment 4 in your eClass/Moodle account.
- The assignment is due Monday Mar.20 2017 at 6 PM MST

Part A

Problem and Program Details:

As a part-time blog writer for a major sports network you are tasked with providing a reader-friendly summary of the most recent Winter Olympics. This will be an integral part of an article that will be used to discuss the next Olympic Games. Given detailed results from the Winter Olympics, which were provided to you by your supervisor, you are asked to summarize the medal standing for all participating countries.

Your input data, which is provided in the `olympics.mat` file that can be downloaded from the eClass/Moodle, includes the following variables:

- `countries`, which lists countries that scored medals. The countries are coded using three letter abbreviations, e.g., CAN stands for Canada. We use country code XXX to denote a case where two countries received the same medal (silver) in the same sport, i.e., there was a tie.
- `gold`, `silver` and `bronze`, which list the countries that received gold, silver, and bronze medals, respectively. Note that the `gold`, `silver` and `bronze` variables list the data in the same order. This means that the i^{th} row in these variables gives the countries that received the corresponding three types of medals for the same sport.

Your objective is to convert the results per sport (from the `olympics.mat` file) into a table that lists medal counts and total medal tally per country where countries are sorted alphabetically. Note that `countries` variable already lists the countries alphabetically. You should also show the best performing country (or countries in case of a tie), when scored on the total medal tally and the number of gold medals. Moreover, you are required to list the countries that have 20 or more medals. The results should be printed to the Command Window using a specific format shown below.

Part B

There will be no submission required, we will be further testing the functionality of your program with another version of the olympics.mat file which contains more data that the initial version.

Please download the olymics.mat file from eClass under assignment 4B and re-run your solution with no modifications to your code.

Code Requirements:

1. You must use at least three sub-functions: the first that will compute number of gold, silver, and bronze medals per country; the second that will print the table with medal standings; and the third that will compute and print the best performing countries. The third sub-function should be called three times; each time for a different criteria of performance (most medals, most gold medals, and at least 20 medals).

2. Your primary/main function `assignment4` should have the following outline:

```
function [] = assign4_<UofA_ID_Number>()

%load olympics.mat file
load('olympics.mat');

% compute medals for each country using a sub-function that is
% called using a loop over all countries

% display medal counts for all countries using a sub-function

% display countries with most medals, most gold medals, >=20 medals
% using a sub-function, the same sub-function should be used 3 times

end %this end terminates the function
```

3. You must use the fprintf statement to display your results to the command window, failure to do so will result in reduction of 20% of your final mark.

4. Do not use the table function to display your results.

5. When running your solution, there are no user inputs other than the load command.

Hints

1. In Matlab, load the `olympics.mat` and see how the data is stored.

2. Do not display results for the XXX “country”, which is included in the olympics.mat file. It may be more straightforward to calculate the medal totals for the XXX "country" initially, and when displaying the results exclude it from being displayed.

3. Note that it is possible that there is more than one country with the highest number of all medals, or highest number of gold medals, or at least 20 medals. In that case, you code should list all of these countries.

4. In the third sub-function, you may want to use `switch` statement to select between different criteria.

5. You must duplicate the shown below output, including spacing and formatting, and provide the data for the remaining countries. The “. . .” denotes the part of the report that you have to fill in.

```
Country Gold Silver Bronze Total
    AUS    2      1      0     3
    AUT    4      6      6    16
...
Countries with the most medals: ...
Countries with the most gold medals: ...
Countries with at least 20 medals: CAN GER ...
```

6. Please remember to include your header at the top of your **.m** file. And finally please comment the primary function and all the subfunctions.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Course: ENCMP 100
% Assignment: 4
% Name: Joe MacDonald
% CCID: jmac
% U of A ID: 1234567
%
% Acknowledgements:
% I received help from Jason Smith on using functions
%
% Description:
% This program calculates medal standings for the Olympics
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```