CSC 362 Programming Assignment #2
Due Date: Tuesday, September 30

In this assignment, you are to use multiple functions and multiple files. If a function is to compute and return a *single value*, it can do so using a return statement as in `x = compute(a, b, c);`. Otherwise, if the function is required to compute or input multiple values, you *must pass* these values through the parameter list. You will have to decide which parameters to pass normally versus as addresses. The primary purpose of this assignment is to test your understanding of parameter passing, so doing so incorrectly will result in a loss of points on your grade. Note that you should only pass parameters as addresses for those parameters that will change in the function (all other parameters should be passed as normal values, not addresses). Remember strings are already passed as addresses.

The program will input various ratings about two football teams that are going to play against each other in order to predict which team will win. All input will come from a data file. The data file consists of two teams (one game) per row. The file contains multiple rows indicating multiple games to predict.

The program will input a line of data using fscanf, process that data and output the result. This repeats until the program reaches the end of the file. Each row consists of 11 items, each separated by a space. The 11 items are in order: HT HTO HTD HTS HTH HTC VT VTO VTD VTS VTR. HT and VT are the home and visiting team's names respectively (strings), all other items are int values on a scale of 1 to 10 (1 being the worst, 10 being the best rating for that particular team attribute). HTO/VTO stand for home and visiting team's offensive worth, HTD/VTD for home and visiting team's defensive worth, HTS/VTS for home and visiting teams' special teams worth, HTH for team's strength at home, HTC for home field advantage (crowd noise) and VTR is the visiting team's strength on the road. All of these values should be stored as variables in main and input from an input function (see below). These values are used to compute 5 values, preference1, preference2, …, preference5. These 5 values are all doubles (again declared in main, computed in a computation function). Given the result of these 5 values, compute a prediction which will be the team that is predicted to win and by how much. Both of these should also be declared in main and computed in a prediction function.

Your program will consist of the following functions:

- main: declare variables, open the input file, iterate through the file (until EOF), and call the various functions listed below. The following functions are called from within the loop except for summary, which is called after. Outside of the loop, also close the file.
    - **input** the 11 data items from the file
    - **compute** the 5 preferences using the following formulas
      preference1 = HTO * OFFENSE_FACTOR - VTD
      preference2 = HTD + 2 – VTO * OFFENSIVE_FACTOR
      preference3 = HTS * SPECIAL_TEAMS_FACTOR – VTS
      preference4 = HTH + HTC ***** HOME_FIELD_ADVANTAGE - VTS
      preference5 = HTO * HTD * HTH * OVERALL_FACTOR – VTO * VTD * VTR
      compute is a single function which receives the needed parameters and computes the five preference values. You must use proper parameter passing. You may (if you choose) implement each of the 5 preference calculations in five additional functions, but that is up to you. For instance, you could do preference1=compute1(HTO,VTD); See below for a description of the constants in the above formulas.
    - **prediction**: given the five preference values, compute a prediction of who wins, home or visitor and by how much. This function works as follows:
      sum = preference1 * OFFENSIVE_WORTH + preference2 * DEFENSIVE_WORTH + preference3 * SPECIAL_WORTH + preference4 * HOME_WORTH + preference5 * OVERALL_WORTH

See below for a description of the constants. If sum < 0 then the visiting team wins else the home team wins. The amount that the team is predicted to win by is the absolute value of sum, truncated as an int. If this value turns out to be 0, then the home team is predicted to win by 1. You can obtain the absolute value by implementing your own function or use abs from the math.h library.

- **output** a summary of the game specifying the winning and losing team names and the predicted amount that the team will win by, such as `Predicted Bengals over Steelers by 16`. Do not output "home" or "visiting" team, output the names.
- **update**: modify 3 running totals of the number of games predicted so far, number of predicted wins by home team, number of predicted wins by visiting team.

- **summary** outputs the number of games that were predicted and the percentage of those games in which the home team is predicted to win. NOTE: This must be output as a percentage such as 71.33%.

Divide your functions into multiple files as follows:

1. A file containing your main function and an include statement for your header file
2. A header file that contains all function prototypes, all used include statements for C libraries, and all constants used in your program. The constants are as follows:
   - OFFENSIVE_FACTOR = 1.5
   - SPECIAL_TEAMS_FACTOR = 1.2
   - HOME_FIELD_ADVANTAGE = 1.3
   - OVERALL_FACTOR = 1.15
   - OFFENSIVE_WORTH = 0.32
   - DEFENSIVE_WORTH = 0.28
   - SPECIAL_WORTH = 0.15
   - HOME_WORTH = 0.1
   - OVERALL_WORTH = 0.15

   Remember that your prototypes should be commented so that someone viewing just the .h file understands what the functions do
3. A file containing your compute, prediction and update functions (all of the computation functions)
4. A file containing your input, output and summary functions (all of the I/O functions)

Run your program on the two data files on the website. Example output for first file is given below. Hand in your source code and the output of running your program on the second of the two data files.

```
Predicted Redskins over Rams by 2
Predicted Packers over Bears by 1
Predicted Bengals over Browns by 6
Predicted Ravens over Steelers by 10
Predicted Patriots over Jets by 2
Predicted 49ers over Seahawks by 3
Out of 6 games, 66.67% favor the home team
```