**CS 1411 501/503/505, Fall 2017, Project, 30 points, Due by midnight 11/30/2017**

**Problem Background**

Dieticians help clients with their caloric intake in order to eat healthier and lose weight if desired. To help clients, they need to know

- Whether the body type of the client is male or female
- The weight of the client in pounds
- The height of the client in inches
- The age of the client in years
- The level of activity of the client as defined by the Harris Benedict Formula

The dietician will use the English Basal Metabolic Rate Formula with the Harris Benedict Formula to determine a client's daily calorie needs. The daily fat needs would be 20% to 30% of the daily calorie need, such as if the daily calorie need is 2000 calories, the fat calorie needs would be 400 to 600 fat calories.

English BMR (Basal Metabolic Rate) Formula
Women: BMR = 655 + ( 4.35 x weight in pounds ) + ( 4.7 x height in inches ) - ( 4.7 x age in years )
Men: BMR = 66 + ( 6.23 x weight in pounds ) + ( 12.7 x height in inches ) - ( 6.8 x age in year )

Harris Benedict Formula (Daily Calorie Need)
To determine your total daily calorie needs, multiply the BMR by the appropriate activity factor, as follows:
1. If sedentary (little or no exercise) : Calorie-Calculation = BMR x 1.2
2. If lightly active (light exercise/sports 1-3 days/week) : Calorie-Calculation = BMR x 1.375
3. If moderatetely active (moderate exercise/sports 3-5 days/week) : Calorie-Calculation = BMR x 1.55
4. If very active (hard exercise/sports 6-7 days a week) : Calorie-Calculation = BMR x 1.725
5. If extra active (very hard exercise/sports & physical job or 2x training) : Calorie-Calculation = BMR x 1.9

For example,

Body Type: male
Weight in [0,400] lbs: 150
Height in [0,120] inches: 72
Age in [0,120] years: 22
Activity level in [1,5]: 4

BMR is 1765.300

Daily calorie need is 3045.143
Daily fat calorie need is from 20% (609.0286) to 30% (913.5429) of the daily calorie need
In fat grams from 67.67 to 101.5 grams daily (1 gram of fat is 9 calories)

To lose weight, reduce calories to 10% below daily 2740.628
Keep daily fat calories from 548.126 to 822.188
In fat grams from 60.903 to 91.354 grams daily

While the dietician may recommend a menu for breakfast, lunch, and dinner, clients may not cooperate, so, the dietician will want commonly eaten items on the menu as well if desired as with the below list. The dietician will make sure the client knows how many calories are being consumed daily by adding up the calories and fat grams of the menu items chosen.

Foods (total calories, fat in grams)

French Fries, 570, 30
Onion Rings, 350, 16
Hamburger, 670, 39
Cheeseburger, 760, 47
Grilled Chicken Sandwich, 420, 10
Egg Biscuit, 300, 12
Mozzarella Sticks, 849, 56
Cheese Pizza, 300, 11
Macaroni and Cheese, 300, 7
Glazed Chicken and Veggies, 497, 7

**Project, 12 Points**
Please work independently or with one other person on the project without help from anyone else other than the course and lab instructors. You are expected to demonstrate mastery of the course material covered so far.

Python programming constructs usable for this project: variables, arithmetic expressions, input/output, if, while, for, functions, strings, files, exceptions, functions, lists, tuples, dictionaries, sets. Please obtain permission from the instructor if you want to use anything additional.

**Problem:**
Write a menu-based program to allow the dietician to input clients and their information. The menu should allow the dietician to

- enter client first and last name, body type, weight, height, age, and level of activity as described in the problem background
- select a client
    - determine daily calorie, fat calories, and fat grams needed
    - choose a menu for breakfast, lunch, and dinner from a list of foods as in the problem background (you may add more to the list if desired) giving total daily food and fat calories
    - recommend a reduced calorie intake if the client wishes to lose weight of 10% less calories than the daily calorie need; the reduced fat calories and grams should be given as well
- exit the program

The program should read in the existing clients and their information (first and last name, body type, weight, height, age, and level of activity) from a file when the program starts and before displaying the menu. The program should also write out the updated clients and information to a file upon exiting.

For an extra challenge, allow the dietician to edit clients and their information or delete clients along with the client's information.

Your submission should have a main comment section with Name, Course, Date, Problem, Given, Analysis, Method/Algorithm, Test Cases and Program. The program code should be commented with the Method/Algorithm.

To submit your program, name your program file: proj_lastname_firstname_labsection.py, such as proj_smith_judy_501.py. Submit your file to the 1411 Blackboard lecture section.

**Grading Rubric**

| 30 Points | Problem Specification<br>10 Points | Main/Program Code Comments, Filename<br>10 Points | Input/Output<br>10 Points |
|---|---|---|---|
| 100% | Program meets the problem specification for the project of implementing a program to allow a dietician to enter clients, determine daily calorie/fat calorie/fat gram needs, choose a menu for breakfast/lunch/dinner, and determine reduced daily calorie/fat calorie/fat gram needs to lose weight.<br><br>Only covered Python programming constructs used, in particular, functions and data structures are used well so that the program is modular. | Main/Program Code Comments are present and filled in as requested. File name is as requested. | Program inputs the clients and their information from a file at the beginning of the program and output the clients and their information upon program exit.<br><br>The program displays a menu, the client's daily calorie/fat calorie/fat gram needs, breakfast/lunch/dinner menu with calories/fat calories/fat grams, and reduced calories/fat calories/fat gram needs for dieting.<br><br>The program allows the dietician to input menu choices, clients, client information, and a menu for breakfast/lunch/dinner.<br><br>Input/File validation errors are caught and printed. |
| 75% | Program is close to the problem specification with 1 or 2 elements incorrect or missing. One or two Python programming uncovered constructs used in the code. | Main/Program Code Comments have 1 or 2 missing or unhelpful entries. File name has 1 or 2 missing requested entries. | Program outputs correctly on most inputs, except for 1 or 2 inputs. |
| 50% | Program is approaching the problem specification, but has several incorrect or missing elements. Several uncovered Python programming constructs used in the code. | Main/Program Code Comments have several missing or unhelpful entries. File name has several requested elements missing. | Program outputs correctly on very few inputs. |
| 0% | Program does not approach or address the problem specification. No mastery of the covered Python programming constructs shown. | Main/Program Code Comments are unhelpful, do not address what was requested, or are completely missing. File name is not in requested format. | Program does not output correctly on any input or may not compile. |