Assignment 3

General Instructions: Save all the files to a directory named "<group-number>_as3", e.g. 23_as3. Compress this directory to a zip file and submit it via Blackboard (on the same place where you have downloaded the assignment). Comment the code well in a clear manner and choose clear names for your variables and parameters. The assignment must be presented Tuesday, 1/12. The deadline for turning in the assignment is 30/11 at 23:59:59.

The program must contain separate functions for the following tasks: calculate body fat %, find user category in body fat table, calculate BMR, calculate corrected maintenance caloric intake, calculate macro nutrient intake compensating for user placement in the body fat% category, calculate concrete food intake recommendations. Log10 can be calculated using the function log10 from the math module.

1 diet.py

Write a program that takes in the weight of a person, their sex, their measurements for height, neck, waist and hip circumference, in cm, and an activity factor ranging from 1 to 5. The function must calculate and print the estimated body fat % of the individual according to the following formulas.

For men

$$BF = 495/(1.0324 - 0.19077 * \log10(\text{waist} - \text{neck}) + 0.15456 * \log10(\text{height})) - 450$$

For women

$$BF = 495/(1.29579 - 0.35004 * log10(waist + hip - neck) + 0.22100 * log10(height)) - 450$$

Given the calculate body fat, the function must find the place in the following charts where the person falls into and print it

Female		Male	
Category	Percentage	Category	Percentage
Essential fat	<14%	Essential fat	<6%
Athlete	14-20%	Athlete	6-13%
Fitness	21-24%	Fitness	14-17%
Normal	25-31%	Normal	18-24%
Overweight	>31%	Overweight	>25%

The program must then calculate and print a basal metabolic rate according to the following formula

$$BMR = 370 + 21.6 * (1 - \text{bodyfat}) * \text{weight},$$

where bodyfat is given in percentage (ex: 0.19).

Following that, the program must calculate and print a maintenance calorie intake, based on the activity factor as follows

Activity factor	Multiplier
1	1.2
2	1.375
3	1.55
4	1.725
5	1.9

$$\text{maintenance calories} = \text{BMR} * \text{multiplier}$$

Once that is done, the program must the propose a diet for the user. If the user falls within the essential fat category, the program must increase the calories used for this calculation by 15%, with respect to the maintenance calories. If the user falls within the overweight category, it must decrease the calories used by 15%. For all other cases, the program must use the maintenance calories without correction.

The proposed diet should use the following macro-nutrient split

Macro	% of calories
Protein	40%
Carbohydrates	30%
Fats	30%

Consider that the macro-nutrients have a caloric content as follows

Macro	Calories per gram
Protein	4
Carbohydrates	4
Fats	9

Thus, if the user had a caloric intake of 2500 that did not needed to be adjusted, the program must calculate and output the following macro recommendation: 250 grams of protein, 187.5 grams of carbohydrates and 83.3 grams of fats.

Finally, the program must calculate and print a concrete simplified diet using the following table or one decided on by the group (research the values you are going to use if you choose to use different values, do not guess values):

Food	Macro nutrient	Quantity
Chicken Breast	Protein	31g per 100g
Sweet Potato	Carbohydrates	26g per 130g
Olive Oil	Fat	100g per 100g

Thus, for the same example user with 2500 calories, the program would output 1041.6 grams of chicken breast, 937.g grams of sweet potato and 83.3 grams of Olive Oil

This is an example of how the output of your program should look like for the following input: weight = 80 neck = 39 waist = 98 height = 180 activity = 2 sex = 'M'.

```
Your body fat % is: 24
You are considered to be overweight
Your basal metabolic rate is 1674
Your maintenance calories are 2302
Your adjusted maintenance calories are 1956
########################
Your recomended protein intake is 195 grams
Your recomended carb intake is 146 grams
Your recomended fat intake is 65 grams
########################
Your recomended chicken consumption is 631 grams
Your recomended potato consumption is 733 grams
Your recomended oil consumption is 65 grams
```