03 Team Activity: Writing Functions

Instructions

Arrange a one hour synchronous meeting with your team for this activity. Online students should coordinate a video-sharing meeting. Campus students will use class time for this meeting. You should prepare for this meeting by completing the preparation material and the individual checkpoint assignment beforehand.

Purpose

Boost your understanding of writing your own functions with parameters and then calling those functions.

Problem Statement

Health professionals who are helping a client achieve a healthy body weight, sometimes use two computed measures named body mass index and basal metabolic rate.

From the U.S. Centers for Disease Control and Prevention we read, "Body mass index (BMI) is a person's weight in kilograms divided by the square of their height in meters. BMI can be used to screen for weight categories such as underweight, normal, overweight, and obese that may lead to health problems. However, BMI is not diagnostic of the body fatness or health of an individual." The formula for computing BMI is

$$bmi = \frac{10{,}000\ weight}{height^2}$$

where *weight* is in kilograms and *height* is in centimeters.

Basal metabolic rate (BMR) is the minimum number of calories required daily to keep your body functioning at rest. BMR is different for women and men and changes with age. The revised Harris-Benedict formulas for computing BMR are

$$\text{(women)}\ \ bmr = 447.593 + 9.247\ weight + 3.098\ height - 4.330\ age$$

$$\text{(men)}\ \ bmr = 88.362 + 13.397\ weight + 4.799\ height - 5.677\ age$$

where *weight* is in kilograms and *height* is in centimeters.

Assignment

Write a Python program named that does the following:

1. Asks the user to enter four values:
    a. gender
    b. birthdate in this format: YYYY-MM-DD
    c. weight in US pounds
    d. height in US inches

2. Converts the weight from pounds to kilograms (1 lb = 0.45359237 kg).
3. Converts inches to centimeters (1 in = 2.54 cm).
4. Calculates age, BMI, and BMR.

5. Prints age, weight in kg, height in cm, BMI, and BMR.

Helpful Documentation

- The prepare content for this lesson explains how to write functions.
- The official Python documentation describes the built-in `round` function.

Steps

Copy and paste the following code into a new program named `fitness.py`. Use the pasted code as a design as you write your program. Write code for each of the functions except `compute_age`. The `compute_age` function is complete and correct, and you should not change it.

```
# Import datetime so that it can be
# used to compute a person's age.
from datetime import datetime


def main():
    # Get the user's gender, birthdate, height, and weight.

    # Call the compute_age, kg_from_lb, cm_from_in, body_mass_index,
    # and basal_metabolic_rate functions as needed.

    # Print the results for the user to see.
    pass


def compute_age(birth):
    """Compute and return a person's age in years.
    Parameter birth: a person's birthdate stored as
        a string in this format: YYYY-MM-DD
    Return: a person's age in years.
    """
    birthday = datetime.strptime(birth, "%Y-%m-%d")
    today = datetime.now()

    # Compute the difference between today and the birthday in years.
    years = today.year - birthday.year

    # If necessary, subtract one from the difference.
    if birthday.month > today.month or \
        (birthday.month == today.month and birthday.day > today.day):
        years -= 1

    return years


def kg_from_lb(lb):
    """Convert a mass in pounds to kilograms.
    Parameter lb: a mass in US pounds.
    Return: the mass in kilograms.
    """
    return


def cm_from_in(inch):
    """Convert a length in inches to centimeters.
    Parameter inch: a length in inches.
    Return: the length in centimeters.
    """
    return


def body_mass_index(weight, height):
    """Calculate and return a person's body mass index (bmi).
```

```
    Parameters:
        weight must be in kilograms.
        height must be in centimeters.
    Return: a person's body mass index.
    """
    return


def basal_metabolic_rate(gender, weight, height, age):
    """Calculate and return a person's basal metabolic rate (bmr).
    Parameters:
        weight must be in kilograms.
        height must be in centimeters.
        age must be in years.
    Return: a person's basal metabolic rate in kcal per day.
    """
    return


# Call the main function so that
# this program will start executing.
```

Core Requirements

1. Your program contains complete and correct functions named `compute_age`, `kg_from_lb`, and `cm_from_in`.

2. Your program contains complete and correct functions named `body_mass_index` and `basal_metabolic_rate`. To be correct, the `basal_metabolic_rate` function must compute BMR differently for males and females.

3. Your program contains a function named `main` which gets four values from the user, calls the other functions, and prints the results for the user to see.

Stretch Challenges

If your team finishes the core requirements in less than an hour, complete one or more of these stretch challenges. Note that the stretch challenges are optional.

1. Modify your program to print the height values in meters instead of centimeters.

2. Modify your program to allow the user to enter weight in British stones and add a function named `kg_from_stone`.

3. Modify your program to allow the user to enter height as US feet and inches.

4. Add something or change something in your program that you think would make your program better, easier for the user, more elegant, or more fun. Be creative.

Testing Procedure

Verify that your program works correctly by following each step in this testing procedure:

1. Run your program and enter the inputs shown below. Ensure that your program's output is similar* to the output below.

```
> python fitness.py
Please enter your gender (M or F): F
Enter your birthdate (YYYY-MM-DD): 2001-03-21
Enter your weight in US pounds: 125
Enter your height in US inches: 54
Age (years): 19
Weight (kg): 56.7
Height (cm): 137.2
Body mass index: 30.1
Basal metabolic rate (kcal/day): 1315

> python fitness.py
Please enter your gender (M or F): M
Enter your birthdate (YYYY-MM-DD): 2003-11-26
Enter your weight in US pounds: 145
Enter your height in US inches: 58
Age (years): 17
Weight (kg): 65.77
Height (cm): 147.3
Body mass index: 30.3
Basal metabolic rate (kcal/day): 1580
```

* Note that the output of your program will not be the same for the Age and BMR values because a computer executed these sample runs before you executed your program. Therefore, when you run your program, the people will be older than they were when the computer completed these sample runs.

Sample Solution

Please work diligently with your team for the one hour meeting. After the meeting is over, please compare your approach to the sample solution [↓]. Please *do not look at the sample solution* until you have either finished the program or diligently worked for at least one hour. At the end of the hour, if you are still struggling to complete the assignment, you may use the sample solution to help you finish.

Ponder

After you finish this assignment, congratulate yourself because you wrote a Python program with six user-defined functions named `main`, `compute_age`, `kg_from_lb`, `cm_from_in`, `body_mass_index`, and `basal_metabolic_rate`. You also wrote code to call those six functions. Why is it important that you know how to write your own functions?

Submission

When you have finished the activity, please report your progress via the associated I-Learn quiz. When asked about which of the requirements you completed, feel free to include any work done during the team meeting or after the meeting, including work done with the help of the sample solution, if necessary. In short, report on what you were able to accomplish, regardless of when you completed it or if you needed help from the sample solution.