TU Dublin- Tallaght Campus
Department of Computing

Software Development 1

Solutions - Laboratory

Create a New Project, called week3, and add a New File (Python) week3exercises to the project. All solutions should be in the week3exercises file. To move on to the next exercise, comment out the previous exercise after completing and running it.

Instructions: Upload the week3exercises.py file.
There is no need to upload the pseudo-code.

Note
For all problems follow the approach discussed in lectures:

- Define data requirements
    - Input data
    - Output data
    - Any Constants
- Design an algorithm
    - i.e. list the steps to solve the problem
- Convert the algorithm to Python code

Enter the program into PyCharm, run and check it for errors until it works

Exercise 1. Converting a given algorithm to a Python program

Write a program to convert 35 degrees Fahrenheit to degrees Celsius.
(Formula you need to convert: celsius = (5/9) * (fahrenheit - 32))
- **Data** Requirements
    Input
        fahrenheit : floating point   - temperature in degrees fahrenheit
    Output
        celsius: floating point   - temperature in degrees celcius
    Constants
        BASE = 32
        CONVERSION_FACTOR = 5/9

- We now design the algorithm
    1. fahrenheit = 35
    2. Convert the degrees to Celsius by:
       celsius = CONVERSION_FACTOR * (fahrenheit - BASE)
    3. Output the degrees in Fahrenheit and Celsius, round the Celsius temperature to two decimal places.

```
BASE = 32
CONVERSION_FACTOR = (5/9)

# Fahrenheit Input
fah_temp = 35

# Calculations
celsius_temp = CONVERSION_FACTOR * (fah_temp - BASE)

# Output
print("Fahrenheit Temperature : ", fah_temp)
print("Celsius Temperature : ", round(celsius_temp, 2))
```

Exercise 2.

Design and write a program that assigns two floating point numbers and prints their
sum, difference, and the product.

```
# Variables
number1 = 9
number2 = 6

# Calculations
sum_of_numbers = number1 + number2
difference_of_numbers = number1 - number2
product_of_numbers = number1 * number2

# Output
print("The sum of the numbers is: ", sum_of_numbers)
print("The difference of the numbers is:", difference_of_numbers)
print("The product of the numbers is:", product_of_numbers)
```

Exercise 3.

Design and write a program that converts 60 miles to kilometres. One mile equals
1.60935 kilometres. Store the miles, kilometre per mile and resulting kilometres in your
program.

```
# Variables
KM_PER_MILE = 1.60935
miles = 60

# Calculations
kilometers = KM_PER_MILE * miles

# Output
print("That distance in kilometers is: ", round(kilometers, 2))
```

Exercise 4.

Fix the last line so that it outputs the sum of 1 and 2. Please do not change the first two lines. Only the last one.

```
1.          a = "1"

2.          b = 2

3.          print(a + b)
```

Expected output: 3

Solution – cast a to int

```
a = "1"
b = 2
print(int(a) + b)
```

Exercise 5.

Design and write a program to solve the following problem. If a group of four pirates finds a chest full of 107 gold coins and they divide the spoils evenly, how many whole gold coins does each pirate get? How many coins are left over?

Use variables to store the number of coins, the number of pirates, calculate the number of whole coins each pirate gets and the number left over and print all the information to the screen after the calculations.

```
pirates = 4
coins = 107

each = coins // pirates
left_over = coins % pirates

print("Each pirate gets", each, "whole coins each")
print("There are", left_over, "coins left over")
```

Exercise 6.

Design and write a program that assigns the length and width of a rectangular yard and the length and width of a rectangular house situated in the yard.

Your program should compute the time required to cut the grass in the yard at the rate of 2 square meters per second. Display the result rounded to 2 decimal places.

```python
# Variables
speed = 2

# Hardcoded variables
yard_width = 40
yard_length = 50
house_width = 30
house_length = 40

# Calculations
house_area = house_width * house_length
yard_area = yard_length * yard_width

grass_size = yard_area - house_area

time = ((grass_size / speed) / 60)

# Output
print("The length of time to cut the grass is ", round(time, 2), " minutes")
```