Homework #2
User-Defined and Built-in Functions (100 points)

Directions:

- Create the following programs in Python that perform the purpose described and produce the sample output (with user input where applicable).
- Include at least ***three lines of comments/remarks in each program***, including your name, the date, and a description of the program.
- Upload your .py Python program to our Moodle/eThink web site for each of the following programs.
- Be sure to adhere to the college and course academic honesty policy.

1. Date program

Write a Python program named hw2-1.py to display the current day of the week as shown and how many days are in the current month. Your output should look like this (as an example – yours shown have live information, i.e. using current day of week and month):

Today is: Friday
Number of days in current month: 31

Your program may need to be the following (to import two libraries):

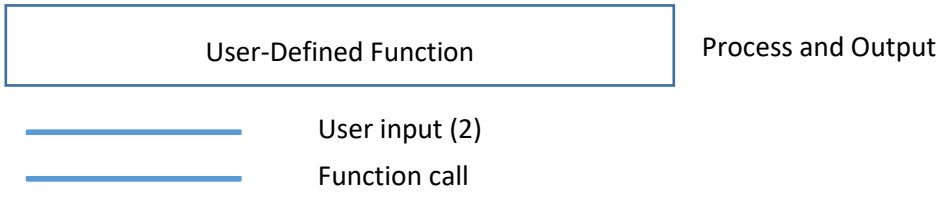
```
import datetime
import calendar
```

2. **Change Owed Program in a Function**. Modify your Homework #1 Program #2 program so it utilizes a user-defined function. Accept the two user inputs in the main part of the program. Then call the user-defined function. The function will then calculate the amount of change the customer is to receive and outputs it. See sample run below.

Sample run:

```
Please enter amount owed: $10.30
Please enter amount paid: $20
Customer receives $9.70 change.
```

Program organization:



3. **Area of Circle Program with a Function**. Modify your Homework #1 Program #3 program to it utilizes a user-defined function and work as follows.

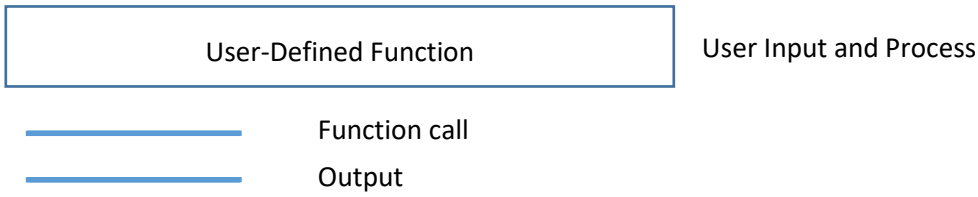
    a. The main part of the program will call a user-defined function.
    b. In the function:
        a. Place the PI constant assignment
        b. Prompt the user to enter the radius of the circle
        c. Calculate the area of the circle
        d. Pass the area back to the main part of the program
    c. The main part of the program will then produce the final output, i.e. area of the circle as shown in the sample run below.

    In the example below, the user entered 2 as the radius of the circle and the program outputted 12.57 as the area of the circle.

    Sample run:

    Enter the radius of the circle? 2
    The area of the circle is: 12.57

    Program organization:

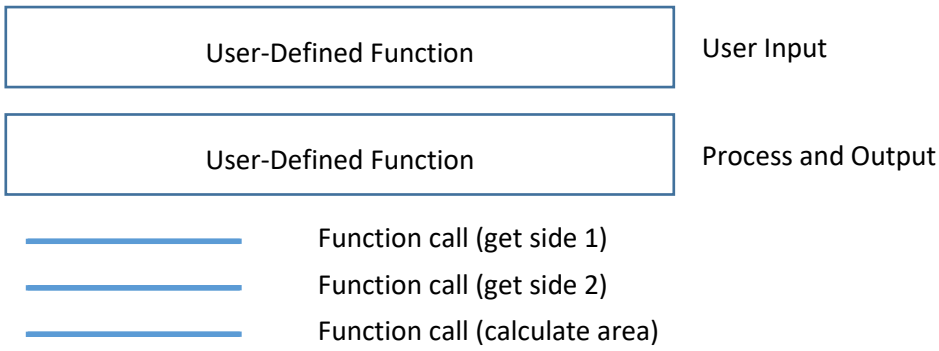
4. **Rectangle Area with Two Functions Program**. Create a Python program with two user-defined functions and works in the following way:

    a. The main part of the program will call a function two times.
    b. This function will prompt the user to enter the length of the side of a rectangle (as a float data type). Return the length value to the main part of the program.
        a. Call this function twice to get the length of the two sides needed for the calculation.
        b. See sample run below. Figuring out how to display #1 and #2 on these lines is optional.
    c. The main part of the program will then call the second function, passing into it the two side lengths.
    d. The second function will then calculate and display the area of the rectangle (round the output to one digit to the right of the decimal place) based on two side lengths entered by the user.
    e. Use the tab escape character to align the user input and output as shown in the sample run below.

    Sample run:

    Please enter length of side #1: 2
    Please enter length of side #2: 3
    The area of the rectangle is: 6.0

Program organization:



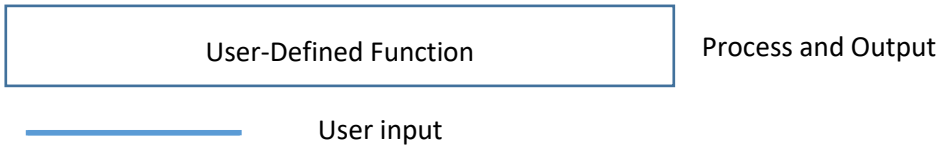
5. **Create a program that gives back change**. In the main, ask the user to enter how make money (in cents) they need to receive change for. Pass this amount to function that will calculate and output the correct change, using the most quarters possible first, then the most dimes possible, the most nickels possible, and then any pennies needed. Here are two sample run of the program.

   Sample runs:

   Please enter the number of cents 26
   Number of quarters 1
   Number of dimes 0
   Number of nickels 0
   Number of pennies 1

   Please enter the number of cents 98
   Number of quarters 3
   Number of dimes 2
   Number of nickels 0
   Number of pennies 3

   Program organization:



6. **Built-In Functions for Text/String and Numbers**. Create a program that asks for two user inputs: one string and one integer. After the user input, output the following based on the user input. This will require the use of various Python string and number built-in functions.

   Sample run:

   Enter a sentence: Hello World
   Enter a number: 4

   The length of the sentence is 11 letters.
   The are 2 word in the sentence.
   The sentence all uppercase is HELLO WORLD
   The sentence in complete reverse is dlroW olleH
   4 squared is 16
   The factorial of 4 is 24
   A circle with a radius of 4 would have an area of 50.27

Homework #2
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Extra Credit (10 pts)

1. One acre of land is equivalent to 43560 square feet. Using Python, prompt the user in the main body of the program to enter in the total square feet in a tract of land, pass this amount into a user-defined function. The function will then calculate and professionally display the number of acres in the tract.

2. A car's miles per gallon can be calculated with the following formula: mpg = miles driven / gallons of gas used. Call a Python function to prompt the user for any data required, calculate the miles per gallon, return the miles per gallon back to the main body of the program, and then professionally display the result.

3. Temperature Converter with Function Program. Write a program that prompts the user for a Fahrenheit temperature in the main part of the program, then pass this value to a user-defined function which will convert it Celsius and professionally display the Celsius conversion.

   Celsius = (5/9) * (Fahrenheit - 32)

   In other words, the input will occur in main and the process and output will occur in the function. Your program should run like this (round Celsius to two digits to right of decimal and display both temperature).

   ```
   Enter Fahrenheit temperature to convert: 100
   100.0  Fahrenheit is equal to 37.78 Celsius.
   ```

4. Create a Python program that uses the Pythagorean Theorem to calculate the length of the third side of a right angle triangle.

   Create a user-defined function that prompts the user to enter the length of a side to the triangle. Call this function twice from the main to get the length of two sides of the triangle (function returns the user input to the main). Then, pass these two values in a second user-defined function that will calculate and display the length of the third side (hypotenuse) of the triangle (using the Pythagorean Theorem).

   You may need to import a built-in math function for square root.

   ```
   import math
   ```

   Sample run:

   ```
   Right Triangle Side Length Calculator
   -------------------------------------------------
   Please length of triangle side: 2
   Please length of triangle side: 3
   Length of third size: 3.61
   ```