
CSE4IP&CSE1PE (Term6), 2020 – Assignment 1

Assessment: This assignment 1 is worth **30%** of the final mark for this subject.

Due Date: Sunday 22 Nov 2020 at 11.59PM

Delays caused by computer downtime cannot be accepted as a valid reason for a late submission without penalty. Students must plan their work to allow for both scheduled and unscheduled downtime. Penalties are applied to late assignments (accepted up to 5 working days after the due date only). See the university policy for details.

Individual Assignment: This is an individual assignment. You are not permitted to work as a group when writing this assignment.

Copying, Plagiarism: Plagiarism is the submission of somebody else's work in a manner that gives the impression that the work is your own. The Department of Computer Science and Information Technology treats academic misconduct seriously. When it is detected, penalties are strictly imposed. Refer to the unit guide for further information and strategies you can use to avoid a charge of academic misconduct. All submissions will be electronically checked for plagiarism.

Objectives: The general aims of this assignment are:

- To practise using concepts and techniques covered in Lectures 1 to 6 and related labs
- To apply those concepts and techniques for practical problem solving, i.e. to design and implement programming solutions

How to submit your assignment

1. The answer for Question 1 must be put in text file A1Q1.py. In this file, you write at the top of the answer: (i) Your student ID, (ii) Your first name, and (iii) Your last name, in that order. Do this for all other questions.
2. Put all your answers in a zip file, with the .zip extension. The name of the zip file should be CSE4IP-20001111 if your student Id is 20001111, for example.
3. Upload the zip file using Assignment 1 Submission set up on the subject's LMS.

Q1. Write up a python program that implements the following algorithm. [10 marks]

Input: Two numbers X and Y representing numbers to multiply together

Output: An integer holding the result of $X * Y$

```
1  $Sum \leftarrow 0$ 
2 while  $Y > 0$  do
3    $Sum \leftarrow Sum + X$ 
4    $Y \leftarrow Y - 1$ 
5 return  $Sum$ 
```

=====

Q2. Write a program that when given as input from the user a number x and value n will find the n^{th} root of x . To make this task easier you will be required to import python's math library, see <https://docs.python.org/3/library/math.html>. [10 marks]

Example:

Please enter a number: 390625

Please enter a value for n: 8

The 8th root of 390625 is 4.999999999999999.

=====

Q3. Write a program that takes as input a string representing a user's name. Your program should output the length of the name and the number of times each vowel occurs in it. [10 marks]

=====

Q4.

a.

Write a program that simulates an unbiased coin flip. Your program should print true if the coin flip results in a head and false if the coin flip results in a tail. The library we will be importing is the random library allowing the programmer to access tools to generate pseudo-random number and perform operations that use these tools. See <https://docs.python.org/3.5/library/random.html>. [5 marks]

b.

Now consider a biased coin. Write a program that takes a value p , with range between 0 and 1, as input from the user and tests a number of coin flips where p is the probability of the flip resulting in a result of heads. **[5 marks]**

Example

What kind of bias do your coins have? 0.5

Coin flip 1 has a value of heads: True

Coin flip 2 has a value of heads: False

Coin flip 3 has a value of heads: True

c.

Write a program that takes a number n as input from the user and simulates n coin flips printing the results each time. **[10 marks]**

Example:

How times would you like to flip the coin? 5

The coin came up heads.

The coin came up tails.

The coin came up tails.

The coin came up heads.

The coin came up heads.

d.

Modify the program from task (c) to store the number of heads and tails in variables. Once you have generated the variables, print the total number of heads and the total number of tails. Calculate the ratio of heads to the total coin flips.¹ Is this ratio what you would expect, what happens to this ratio as you change the probability of the coin coming up heads? What happens as the number of coins being flipped becomes large? **[15 marks]**

e.

Using the documentation from the random library, use `random.randrange(a)` to extend your program so that it uses 3 sided coins. **[15 marks]**

```
Please input the number of coin flips: 10
Side3
tails
tails
heads
heads
tails
tails
Side3
heads
Side3
Side1 total 3 , Side2 total 4 and Side3 total 3
The ratio heads / total tries is: 0.3
```

=====

Q5.

- a. Write a function, named *adjust*, that takes a number of cents between 0 and 9, inclusive, rounds it off to the nearest 5 cents by the following rules, and returns the result: **[10 marks]**

- 1 and 2 cents are rounded off to 0
- 3, 4, 6 and 7 cents are rounded off to 5
- 8 and 9 cents are rounded off to 10 cents

- b. Write a function, named *roundOff*, that takes an amount of money in dollars, and rounds it off to the nearest 5 cents and returns the result. The amount is entered as a decimal number with 0, 1 or 2 decimal places. The rounding off is based on the rules given above. **[10 marks]**