

The logo for Langara College, featuring the word "Langara." in a large, orange, serif font. Below it, the words "THE COLLEGE OF HIGHER LEARNING." are written in a smaller, black, sans-serif font. The entire logo is enclosed in a white rectangular box with a thin grey border and a subtle drop shadow.

Langara.

THE COLLEGE OF HIGHER LEARNING.

COMPUTING FOR DATA ANALYTICS(CPSC 4800)

Assignment #2

Due Date: **June 30, 2023**

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I Questions

- ☐ Upon completion of this assignment, you learn
 - ➡ How to use **iteration** control structure?
 - ➡ How to use **recursion**?
 - ➡ The disadvantages of using **recursion**?
 - ➡ How to compute power using a **fast exponentiation** algorithm?

- ☐ For all questions, use the following code to test your function

```
1 | powers = [compute_power(2,x) for x in range(0,10**3)]  
2 | print(powers)
```

Using Iteration

(7 marks)

1. Using **iteration** control structure, define a **Python** function that takes two parameters *base* and *exp* and returns the power $base^{exp}$. Save the function along with the testing code in file with an appropriate name. (5 marks)
2. Test your function. Does your function run without errors? Explain any errors that have occurred. (2 marks)

Using Recursion

(13 marks)

1. Using **recursion**, define a **Python** function that takes two parameters *base* and *exp* and returns the power $base^{exp}$. Save the function along with the testing code in file with appropriate name. (8 marks)

2. Test your function. Does your function run without errors? Explain any errors that have occurred. (5 marks)

Fast Exponentiation using Iteration

(15 marks)

1. Using **iteration** control structure, define a **Python** function that takes two parameters *base* and *exp* and returns the power $base^{exp}$ using the following **fast exponentiation** algorithm. Save the function along with the testing code in file with an appropriate name. (13 marks)

$$base^{exp} = \begin{cases} base \times (base^2)^{\frac{exp-1}{2}} & exp \text{ is odd} \\ (base^2)^{\frac{exp}{2}} & exp \text{ is even} \end{cases}$$

2. Test your function. Does your function run without errors? Explain any errors that have occurred. (2 marks)

Fast Exponentiation using Recursion

(15 marks)

1. Using **recursion**, define a **Python** function that takes two parameters *base* and *exp* and returns the power $base^{exp}$ using the following **fast exponentiation** algorithm. Save the function along with the testing code in file with an appropriate name. (10 marks)

$$base^{exp} = \begin{cases} base \times (base^2)^{\frac{exp-1}{2}} & exp \text{ is odd} \\ (base^2)^{\frac{exp}{2}} & exp \text{ is even} \end{cases}$$

2. Test your function. Does your function run without errors? Explain any errors that have occurred. (5 marks)

PEP 8 Coding Style

(20 marks)


1. Each **Python** source file must have **doc string** comment with your name and id **(8 marks)**
2. Use PEP 8 compliant names for all identifiers **(6 marks)**
3. Use appropriate **multi-line** comments to explain your code **(6 marks)**

II Marking Scheme

Task	Marks
Using Iteration	7
Using Recursion	13
Fast Exponentiation using Iteration	15
Fast Exponentiation using Recursion	15
PEP 8 Coding Style	20
Total	70

III submission

Submission

 Zip up your Python source files, renaming the zip file to YourName-ID.zip, and Upload your zip file to the submission Page on Brightspace