**CO322 – Data Structures and Algorithms**

**Lab 02 - Algorithm Explanation for the Problems**

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1. **Power Sum Problem.**

Considering the power sum value for at X = 20 and N = 2. Then we consider the algorithm step by step.

* Step 01

powerSum (20, 2, 1)

In this step, we check that the X =1. If X=1. Then the power sum value will be 1. And here the result = 1. That is the 1st square value. From here we should check, is there any other square value which gives a power sum value with the 1.

* Step 02

In the second step we consider about the second square number. That is 4. So, in here result value is 4.

|  |  |  |
| --- | --- | --- |
| powerSum(20, 2, 2) | + | powerSum(19, 2, 2) |

In here we check that the second square value is equal to the X

In here we checked that the second square value gives a power sum value with the initial square value.

* Step 03

In the third step the result value will be third square number.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| powerSum(20, 2, 3) | + | powerSum(16, 2, 3) | , | powerSum(19, 2, 3) | + | powerSum(15, 2, 3) |

Checking the power sum value with 2nd square value.

Checking the power sum value with 1st square value.

* Step 04

In 4th step we consider the 4th square number. So the result value will be 16.

Checking the power sum value with 4th square value>11.Then returning 0.

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| --- | --- | --- |
| powerSum(20, 2, 4) | + | powerSum(11, 2, 4) = 0 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| powerSum(16, 2, 4) = 1 | + | powerSum(7, 2, 4) = 0 |
|  |  |  |

Checking the power sum value with 4th square value=16.It will give a power sum value with 2nd square value. Then returning 1.

|  |  |  |
| --- | --- | --- |
|  |  |  |
| powerSum(19, 2, 4) | + | powerSum(10, 2, 4) = 0 |

|  |  |  |
| --- | --- | --- |
| powerSum(15, 2, 4) = 0 | + | powerSum(6, 2, 4) = 0 |

1. **Caesar Cipher**

* Initially I have declaring two final strings to store all lower case and uppercase alphabetic letters.
* In here initially I took the length of the string. Then I go through the string using for loop.
* Here I consider both lowercase and uppercase characters separately.
* For both types, initially I took the position of the character in relevant final string.
* Then I took the encrypted position using the shift value.
* Then I took the encrypted character using encrypted position from relevant final string.
* If it is a non-alphabetical character, it added to the encrypted string without any change.
* Then return the encrypted string.

## Climbing the Leaderboard

## In here initially I took the length of both two lists.

## Then defined two lists for store the non-repeating rank values and final rank values.

## Then using a for loop created the list of nonrepeating rank values.

## Then using the nested loops created the final rank list.