**CS112-Fall 2020**

**Assignment 6**

**Submission deadline: 14th June 2020 11:59 p.m.**

**Group size=2**

Problem Statement:

Consider a group of sparse polynomials to be added as follows:

P1 = 0 + x + 0x2 + x3 + 0x4 + x5 + 0x6 + x7 + x8

P2 = 1 + x + x2 + 0x3 + x4 + 0x5 + x6 + 0x7 + x8

P3 = 0 + 0x + x2 + 0x3 + 0x4 + x5 + x6 + 0x7 + x8

P4 = 1 + 0x + x2 + x3 + 0x4 + 0x5 + 0x6 + x7 + 0x8

P5 = 0 + x + 0x2 + 0x3 + 0x4 + 0x5 + x6 + 0x7 + x8

The above set of polynomials will be given in the form of a text file (matrix) named example.txt with contents as follows:

*10*

*5*

*0 0 0 1 0*

*1 0 0 1 0*

*0 0 0 0 0*

*1 0 0 0 0*

*0 0 0 0 0*

*0 0 0 0 0*

*0 0 0 0 0*

*0 0 0 0 0*

*0 0 0 0 1*

*0 1 0 0 0*

In the text file, the first line gives the number of polynomials, while the second line is the number of variables. The remaining numbers are the coefficient values for the polynomials. For the sake of simplicity the coefficients are shown as binary, but they can be integer and reals too.

Write a program that performs addition of a group of polynomials by reading corresponding data from a text file with the above given format.

The data structures used to represent the polynomial will be an **array** as well as a **linked list**. Using the two data structures, polynomial P1 will be represented as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 1 | 0 |

*Array data structure starting at 0 index*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 |  |  | 1 | 3 |  |  | 1 | 5 |  |  | 1 | 7 |  |  | 1 | 8 | Ø |

*Linked list data structure with the second value representing the power of the variable*

REQUIREMENT

You are required to code an application that performs group addition as follows:

**1.** Reads the data about the group of polynomials to be added from the text file.

**2.** Asks the user which data structure to use to store the polynomials.

**3.** Performs the addition, by first adding two polynomials and storing their result (in the data structure used), then adding the third polynomial to the result, and repeating this process till all polynomials have been added and then displaying the result on the screen and also writing in a text file named result\_addition.txt.