Data Structures Lab (CSC204) **Session: Monsoon 2021-22**
III BTech (CSE) **Date: 14.09.2021**

Practice Assignment-1

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1. In a special kind of representation, a sparse matrix (a matrix in which most of the elements are zero) is represented as a one-dimensional array of n linked lists. The i^{th} list will store all the non-zero entries of the i^{th} row of the matrix. Each node of the linked list has three fields, i.e., column index, value of non-zero element, and link to next node.

   a) Write a program to take a sparse matrix of size $n \times n$ as input from the user, and represent the matrix in the above-mentioned representation.

   Sample Input:

   $n = 5$

   ```
   2 0 0 1 0
   0 0 0 0 5
   0 4 0 0 4
   6 0 7 0 0
   0 0 0 9 0
   ```

   Sample Output:

   Row1: (0, 2) → (3, 1) → END
   Row2: (4, 5) → END
   Row3: (1, 4) → (4, 4) → END
   Row4: (0, 6) → (2, 7) → END
   Row5: (3, 9) → END

2. Write a program to represent two given polynomials $p_1(x)$ *and* $p_2(x)$ using linked list, and to calculate $[(p_1(x) * p_2(x)) - (p_1(x) + p_2(x))]$.

Sample Input:

$p_1(x)$: $4x^2 + 3x + 1$

$p_2(x)$: $x^3 + 5x + 7$

Sample Output:

$4x^5 + 3x^4 + 20x^3 + 39x^2 + 18x - 1$