Problem No. 1: Polynomial equation

Polynomial equations are equations that have multiple terms made up of numbers and variables. You are required to design a solution in order to represent polynomial for computer manipulation.

The main requirement is to make use of linked list to hold each term of the polynomial for example:

Linked List1: $4X^7+2X^6-X^3+4X^2+3=0$
Linked List2: $2X^{8+}3X^3-2=0$
Resultant linked list: $2X^8+4X^{7+}2X^6+2X^3+4X^2+1=0$

For above given list1 the first node of the list1 contains a structure of Co-efficient= +4, Base= X and Exponent = 7 and in the very same fashion rest of the terms are stored. The polynomial linked list is always stored in descending order of power and in single variable (Base).

a. You are required to write a program that can add two instances of this lists and store its result in another list. Within the input file each list equation is entered. You have to read each equation and form a linked list of them first; then form resultant linked list by adding the equations up.

INPUT FILE	OUTPUT FILE
$4X^7-2X^6-X^3+4X^2+3=0$ $2X^6+3X^2-2=0$	$4X^7-X^3+7X^2+1=0$

b. Differentiation is the action of computing a derivative. The derivative of a function y = f(x) of a variable x is a measure of the rate at which the value y of the function changes with respect to the change of the variable x. Next you are required to calculate the derivative of the resultant linked list created in above part. The output file created in above part will be used as input file to read off for this part.

INPUT FILE	OUTPUT FILE
$4X^7-X^3+7X^2+1=0$	$28X^6-3X^2+14X=0$

Problem No. 2 Word search

A word puzzle is where you have jumbled up matrix of letters with words hidden and can be read if read in a certain direction (up down left right diagnolly) in this Question you may only consider four directions (up down left right). Given a matrix of words and a list of words you need to find the starting index of each word if it exists else say it doesn't appear in the puzzle.

You will have an input In.txt in which the first line will have two number which represent the length of rows and column for the word puzzle. followed by n number of lines (n = row) with m length strings (m=col). The next line will tell you number of words k followed by k words.

Your output file should have the index for the first letter of each word in the puzzle if the word exists else write n

Input Format

```
5 6
gakiwi
rpopla
apapba
plemon
eeepbp
6
apple
lemon
banana
kiwi
papaya
grape
```

Output Format

```
0 , 1
3 , 1
n
0 , 2
n
0 , 0
```