Lab Nine

ID1303: Introduction to Programming

1. We say that a matrix contains a word if the letters of the word are present in consecutive locations in any of the following four configurations: left-right, right-left, up-down, down-up. For example, the matrix

   TOP

   EXA

   NEZ

   contains the words TOP (left-right), ZEN (right-left), OX (up-down), ZAP (down-up).

   (a) Write a function which accepts a matrix and a word (as a string). The function returns 1 if the matrix contains the word and 0 otherwise.

   (b) Use your function from (a) and write a program to print all words in the file "words.txt" which are contained in the 20-by-20 matrix in the file "matrix.txt".

2. (a) Write a function that accepts a permutation of $1, 2, \ldots, n$ and finds the next permutation in the lexicographic order. For example, if the permutation is 42816753, the next permutation is 42817356.

   (b) Use your function above to print all permutations of a given string.

3. Create a structure called Polynomial to store the degree n and the coefficients $a_0, a_1, \ldots, a_n$ of a real polynomial $a_0 + a_1x + \ldots + a_nx^n$. Accept two polynomials $P(x)$ and $Q(x)$ from the user and print the coefficients of the quotient and remainder when $P(x)$ is divided by $Q(x)$.