**Training on Problem Solving – Notes.**

1. **Code As data:**

**Example:**

Write a program to implement the ROT13 cipher.

Example: Input - Hello.

Output - Uryyb.

**My Approach:**

Check upper case or lower case

If letter > m letter – 13 else if letter < m letter +13

If letter < M letter + 13 else if letter > M letter - 13

**Code as Data:**

Store all the uppercase and lowercase alphabets in a char array [A, a, B, b. . . Z, z].

Add letter+26. {A + 26 =M, a+26= m}.

1. **Preprocessing:**

**Example:**

we write it as 4x^4 - 2x^3 + 4x^2 + 3.Mathematicians write it as 3 + 4x^2 -2x^3 + 4x^4.

Write a program to print it like mathematician.

**My Approach**:

Replace + and - by space. (4x^4 2x^3 4x^2 3).

Split at space, we get the terms from the polynomial in an array. [4x^4, 2x^3, 4x^2, 3]

Print it in reverse order. [3, 4x^2, 2x^3, 4x^4].

replace , by + [3+4x^2+2x^3+4x^4].

(This approach fails it the terms contains – sign).

**Preprocessing:**

Check the first term, if there is no sign append +. (+4x^4-2x^3+4x^2+3).

Replace - by +-. (+4x^4+-2x^3+4x^2+3).

Split at +. [4x^4,-2x^3, 4x^2, 3]

Print it in reverse order. [3, 4x^2, - 2x^3, 4X^4]

Replace, by + [3+4X^2+-2x^3+4x^4].

1. **Sentinel Values:**

**Example:**

You are given a list of roll numbers of those students who are present in a class.

You are told that the roll numbers start at 1 and go up to N - given number. You are also told that one student is absent.

Find the roll number of absentee.

**My Approach:**

Store the list of roll numbers present in an array. [1, 3, 5, 2]

Sort it. [1, 2, 3, 5]

Find the difference between adjacent roll numbers. {(2-1), (3-2), (5-3)}

If the result is greater than 1, then the absentee lies in between this number.

(This approach fails if the first person and last person are absent).

**Sentinel Values:**

Store the present roll numbers in an array. a= [1, 3, 5, 2]

Sort it. [1, 2, 3, 5]

Declare an array b with size, int b [] = new int[c], where c=a.length () + 2.

Append first value and last value of b as 0 and N, copy all the values a to b. b= {0, 1, 2, 3, 5, 6}

Find the difference between adjacent roll numbers. {((1-0), (2-1), (3-2), (5-3), (6-5}

If the result is greater than 1, then the absentee lies in between this number.

1. **Decorate Sort and Undecorate:**

**Example:**

Read the file "war and peace.txt" and find the top 20 occurring words.

**My Approach:**

Open the file and split by space.

Count the no of occurrence of each words and store it in Hash Map as word, count of the word.

Using Collections sort the words according to its number of Occurrences.

Print the words whose occurrence id greater than 1, Repeat this 20 times in a loop to print top 20 words.

**Decorate sort and Undecorate:**

Open the file and split by space.

Count the no of occurrence of each words and store it in Hash Map as word, count of the word.

Count the total number of words.

Subtract the number of word occurrence from the total word Count, and store it in hash map.

Print the first 20 words from hash map.