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Project Work - 2013-14
Class - XII
Computer Science

Question 1.

Write a program which takes a string (maximum 80 characters) terminated by a full stop. The words in this string are assumed to be separated by one or more blanks. Arrange the words of the input string in descending order of their lengths. Same length words should be sorted alphabetically. Each word must start with an uppercase letter and the sentence should be terminated by a full stop.

Test your program for the following data and some random data.

Sample Data :

Input : This is human resource department.

Output : Department Resource Human This Is.

Input : To handle yourself use your head and to handle others use your heart.

Output : Yourself Handle Handle Others Heart Head Your Your And Use Use To To.

Question : 2

Consider the sequence of natural numbers

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29,

Removing every second number produces the sequence

1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29,

Removing every third number from the above sequence produces

1, 3, 7, 9, 13, 15, 19, 21, 25, 27,

This process continues indefinitely by removing the fourth, fifth, And so on, till after a fixed number of steps, certain natural numbers remain indefinitely. These are known as lucky numbers. Write a program to generate and print lucky numbers less than a given natural number n where $n \leq 50$.

Sample input : $n = 10$

Output :

THE LUCKY NUMBERS LESS THAN 10 ARE :

1 3 7

Sample input : $n = 25$

Output :

THE LUCKY NUMBERS LESS THAN 25 ARE :

1 3 7 13 19

Question 3.

A sentence is terminated by either ".", "!" or "?" followed by a space. Input a piece of text consisting of sentences. Assume that there will be a maximum of 10 sentences in block letters.

Write a program to :

- i) obtain the length of the sentence (measured in words) and the frequency of vowels in each sentence
- ii) generate the output as shown below using the given data

Sample data :

INPUT

HELLO! HOW ARE YOU? HOPE EVERYTHING IS FINE. BEST OF LUCK.

Question : 5

The computer department of the Agency of International Espionage is trying to decode intercepted messages. The agency's spies have determined that the enemy encodes messages by first converting all characters to their ASCII values and then reversing the string. For example, consider A_z (the underscore is just to highlight the space). The ASCII values of A, <space>, z are 65, 32, 122 respectively. Concatenate them to get 6532122, then reverse this to get 2212356 as the coded message.

Write a program which reads a coded message and decodes it. The coded message will not exceed 200 characters. It will contain only alphabets (A... Z, and a...z) and spaces. ASCII values of A...z are 65...90 and those of a...z are 97... 122.

Test your program for the following data and some random data.

SAMPLE DATA

Input :

Encoded Message :

2 3 1 2 1 7 9 8 6 2 3 1 0 1 9 9 5 0 1 8 7 2 3 7 9 2 3 1 0 1 8 1 1 7 9 2 7

Output

THE DECODED MESSAGE :

Have A Nice Day

* * * *

Input :

Encoded Message :

2 3 5 1 1 0 1 1 5 0 1 7 8 2 3 5 1 1 1 2 1 7 9 9 1 1 8 0 1 5 6 2 3 4 0 1 6 1 1 7 1 1 4 1 1 4 8

Output :

THE DECODED MESSAGE :

Truth Always Wins

* * *

(* should be capital letters)

Question : 6

A positive whole number 'n' that has 'd' number of digits is squared and split into two pieces, a right-hand piece that has 'd' digits and a left-hand piece that has remaining 'd' or 'd-1' digits. If the sum of the two pieces is equal to the number, then 'n' is a Kaprekar number. The first few Kaprekar number are: 9,45,297.....

Example 1:

9
 $9^2=81$, right-hand piece of 81 = 1 and left hand piece of 81 = 8
Sum = 1 + 8 = 9, i.e. equal to the number.

Example 2 :

45
 $45^2=2025$, right-hand piece of 2025 = 25 and left hand piece of 2025 = 20
Sum = 25 + 20 = 45, i.e. equal to the number.

Example 3:

297
 $297^2=88209$, right-hand piece of 88209 = 209 and left hand piece of 88209 = 88
Sum = 209 + 88 = 297, i.e. equal to the number.

Given the two positive integers p and q, where $p < q$, write a program to determine how many Kaprekar number are there in the range between p and q (both inclusive) and output them.

The input contains two positive integers p and q. Assume $p < 5000$ and $q < 5000$. You are to output the number of Kaprekar numbers in the specified range along with their values in the format specified below:

SAMPLE DATA:

INPUT:

p=1

q=1000

OUTPUT:

THE KAPREKAR NUMBERS ARE:

1, 9, 45, 55, 99, 297, 703, 999

FREQUENCY OF KAPREKAR NUMBERS IS: 8

Question 7.

Input a paragraph containing 'n' number of sentences where $(1 \leq n < 4)$. The words are to be separated with a single blank space and are in UPPERCASE. A sentence may be terminated either with a full stop '.' or a question mark '?' only. Any other character may be ignored. Perform the following operations :

- i) Accept the number of sentences. If the number of sentences exceeds the limit, an appropriate error message must be displayed.
- ii) Find the number of words in the whole paragraph.
- iii) Display the words in ascending order of their frequency. Words with same frequency may appear in any order.

Example 1

Input : Enter number of sentences

1

Enter sentences

TO BE OR NOT TO BE

Output : Total number of words 6

Word	Frequency
OR	1
NOT	1
TO	2
BE	2

2. Input : Enter number of sentences

5

Output : Invalid entry

Question : 8

Write a program to accept a date in the string format dd/mm/yyyy and accept the name of the day on 1st of January of the corresponding year. Find the day for the given date.

Example :

Input :
 Date : 5/7/2001
 Day on 1st January : MONDAY
 Output :
 Day on 5/7/2001 : THURSDAY

Test run the program on the following inputs.

INPUT DATE	DAY ON	OUTPUT
4/9/1998	1st January	FRIDAY
31/8/1999	THURSDAY	FRIDAY
6/12/2000	FRIDAY	TUESDAY
	SATURDAY	WEDNESDAY

Question 9.

A sentence in the SPECIAL FASHION can be printed by taking two integers (not beyond total number of words of sentence or less than 1). These integers tell word number of the sentence. Replace only those words present at integers places by the next character in circular Fashion. If both the integers are same then replace only one word. Let us consider the following example.

- i) Input Sentence : He has good Books
Input Integers : 2, 4
Output Sentence : He ibt good copl.
- ii) Input Sentence : Time and tide waits for none.
Input Integers : 3, 3
Output Sentence : Time and ujej waits for none

Write a case sensitive program that reads a sentence and two positive integers and output the same sentence after replacing each character of that word by the character which is next in the alphabetic list in circular fashion followed by the full stop.

Question : 10

In a engineering college a projects was all dates. The projects should be completed on given number of days. Write a program to input project completion date in the format day (dd), month (mm) and year (yyyy) and the number of days (day) that was given on the date of allotment of project. Print the date in the format dd,mm,yyy on which the project was allotted. Test your program for given data

- 1) Input : Project completion date
Day : 20
Month : 12
Year : 2007
No. of days : 70
- Output : Project allotment date
Day : 12
Month : 10
Year : 2007
- 2) Input : Project compilation date
Day : 20
Month : 01
Year : 2008
No.of day : 40
- Output : Project allotment date
Day : 12
Month : 12
Year : 2007

Question : 11

Design a program to accept a day number (between 1 and 366), year (in 4 digits) from the user to generate and display the corresponding date. Also accept 'N' ($1 \leq N \leq 100$) from the user to compute and display the future date corresponding to 'N' days after the generated date. Display an error message if the value of the day number, year and N are not within the limit or not according to the condition specified.

Test your program for the following data and some random data.

1. Example :

INPUT :

```
DAY NUMBER      : 233
YEAR            : 2008
DATE AFTER (N)  : 17
```

OUTPUT :

```
20TH AUGUST 2008
DATE AFTER 17 DAYS : 6TH SEPTEMBER 2008
```

2. Example

INPUT :

```
DAY NUMBER      : 360
YEAR            : 2008
DATE AFTER (N)  : 45
```

OUTPUT :

```
25TH DECEMBER 2008
DATE AFTER 45 DAYS : 8TH FEBRUARY 2009
```

Question : 12

Encryption is a technique of coding messages to maintain their secrecy. A string array of size 'n' where n is greater than 1 and less than 10, stores single sentences (each sentence ends with a full stop) in each row of the array.

Write a program to accept the size of the array. Display an appropriate message if the size is not satisfying the given condition. Define a string array of the inputted size and fill it with sentences row-wise. Change the sentence of the odd rows with an encryption of two characters ahead of the original characters. Also change the sentence of the even rows by storing the sentence in reverse order. Display the encrypted sentences as per the sample data given below :

Test your program for the following data and some random data.

1. Example :

INPUT :

```
n=4
IT IS CLOUDY.
IT MAY RAIN.
THE WEATHER IS FINE.
IT IS COOL.
```

OUTPUT :

```
KV KU ENQWFA.
RAIN MAY IT.
VJG YGCVJGT KU HKPG.
COOL IS IT.
```

2. Example :

INPUT :**OUTPUT :**

```
n=3
INVALID ENTRY
```


Question : 13

Write a program to input a natural number less than 1000 and display it in words.
Test your program on the sample data and some random data :

1. Example :

INPUT :	29
OUTPUT :	TWENTY NINE
INPUT :	17001
OUTPUT :	OUT OF RANGE
INPUT :	119
OUTPUT :	ONE HUNDRED AND NINETEEN
INPUT :	500
OUTPUT :	FIVE HUNDRED

Question : 14

An ISBN (International Standard Book Number) is a ten digit code which uniquely identifies a book.

The first nine digits represent the Group, Publisher and Title of the book and the last digit is used to check whether ISBN is correct or not.

Each of the first nine digits of the code can take a value between 0 and 9. Sometimes it is necessary to make the last digit equal to ten; this is done by writing the last digit of the code as X.

To verify as ISBN, calculate 10 times the first digit, plus 9 times the second digit, plus 8 times the third and so on until we add 1 time the last digit. If the final number leaves no remainder when divided by 11, the code is a valid ISBN.

For example :

$$1. \quad 020110331 = 10*0+9*2+8*0+7*1+6*1+5*0+4*3+3*3+2*1+1*1=55$$

Since 55 leaves no remainder when divisible by 11, hence it is a valid ISBN.

$$2. \quad 007462542X = 10*0+9*0+8*7+7*4+6*6+5*2+4*5+3*4+2*2+1*10=176$$

Since 176 leaves no remainder when divisible by 11, hence it is a valid ISBN.

$$3. \quad 0112112425 = 10*0+9*1+8*1+7*2+6*1+5*1+4*1+3*4+2*2+1*5=71$$

Since 71 leaves a remainder when divisible by 11, hence it is not a valid ISBN.

Design a program to accept a ten digit code from the user. For an invalid input, display an appropriate message. Verify the code for its validity in the format specified below:

Test your program with sample data and some random data.

Example 1

INPUT CODE: 0201530821

OUTPUT: SUM = 99

LEAVES NO REMAINDER - VALID ISBN CODE

Example 2

INPUT CODE: 035680324

OUTPUT: INVALID INPUT

Example 3

INPUT CODE: 0231428031

OUTPUT: SUM = 122

LEAVES REMAINDER - INVALID ISBN CODE

Question : 15

Write a program to declare a square matrix A [] [] of order (M×M) where 'M' is the number of rows and the number of columns such that M must be greater than 2 and less than 20. Allow the user to input integers into matrix. Display appropriate error message for an invalid input. Perform the following tasks:

- (a) Display the input matrix.
- (b) Create a mirror image of the inputted matrix.
- (c) Display the mirror image matrix.

Test your program for the following data and some random data:

Example 1

```
INPUT : M = 3
      4 16 12
      8  2 14
      6  1  3
```

```
INPUT : ORIGINAL MATRIX
      4 16 12
      8  2 14
      6  1  3
```

```
MIRROR IMAGE MATRIX
      12 16  4
      14  2  8
      3  1  6
```

Example 2

```
INPUT : M = 22
INPUT : SIZE OUT OF RANGE
```

Question : 16

A palindrome is a word that may be read the same way in either direction.

Accept a sentence in UPPER CASE which is terminated by either ".", "? or!". Each word of the sentence is separated by a single blank space.

Perform the following tasks:

- (a) Display the count of palindromic words in the sentence.
- (b) Display the palindromic words in the sentence.

Example of palindromic words:

MADAM, ARORA, NOON

Test your program with the sample data and some random data:

Example 1

```
INPUT : MOM AND DAD ARE COMING AT NOON.
INPUT : MOM DAD NOON
NUMBER OF PALINDROMIC WORDS : 3
```

Example 2

```
INPUT : NITIN ARORA USES LIRIL SOAP.
INPUT : NITIN ARORA LIRIL
NUMBER OF PALINDROMIC WORDS : 3
```

Example 3

```
INPUT : HOW ARE YOU?
INPUT : NO PALINDROMIC WORDS
```