- Question:

The International Mobile Station Equipment Identity or IMEI is a number, usually unique, to identify mobile phones, as well as some satellite phones. It is usually found printed inside the battery compartment of the phone.

The IMEI number is used by a GSM network to identify valid devices and therefore can be used for stopping a stolen phone from accessing that network.

The IMEI (15 decimal digits: 14 digits plus a check digit) includes information on the origin, model, and serial number of the device.

The IMEI is validated in three steps:

Starting from the right, double every other digit (e.g., 7 becomes 14).

Sum the digits (e.g., 14 → 1 + 4).

Check if the sum is divisible by 10.

For Example:

If input is IMEI = 490154203237518

IMEI	4	9	0	1	5	4	2	0	3	2	3	7	5	1	8
Double every other digits	4	18	0	2	5	8	2	0	3	4	3	14	5	2	8
Sum digits	4 + (1 + 8) + 0 + 2 + 5 + 8 + 2 + 0 + 3 + 4 + 3 + (1 + 4) + 5 + 2 + 8 = 60														

Since, 60 is divisible by 10, hence the given IMEI number is Valid.

Design a program to accept a fifteen digit number from the user and check whether it is a valid IMEI number or not. For an invalid input, display an appropriate message.

Sample Output:

1. Enter a 15 digit IMEI code : 654122487458946

Output : Sum = 80

Valid IMEI Code

2. Enter a 15 digit IMEI code : 799273987135461

Output : Sum = 79

Invalid IMEI Code

3. Enter a 15 digit IMEI code : 79927398713

Output : Invalid Input

- Question:

A special two-digit number is such that when the sum of the digits is added to the product of its digits, the result is equal to the original two-digit number.

Example:

Consider the number 59.Sum of digits = 5+9=14

Product of its digits = 5 x 9 = 45

Sum of the digits and product of digits = 14 + 45 = 59

Write a program to accept a two-digit number. Add the sum of its digits to the product of its digits. If the value is equal to the number input, output the message “special-two digit number” otherwise, output the message “Not a special two-digit number”.

- Question:

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 an 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. 0201103311 = 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 divided by 11, hence it is a valid ISBN.

2. 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 divided by 11, hence it is a valid ISBN.

3. 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 no remainder when divided 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 the 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:

Write a Program in Java to input a number and check whether it is a Kaprekar number or not.

Note: 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 numbers are: 9, 45, 297 ……..

Example 1: 9

92 = 81, right-hand piece of 81 = 1 and left hand piece of 81 = 8

Sum = 1 + 8 = 9, i.e. equal to the number. Hence, 9 is a Kaprekar number.

Example 2: 45

452 = 2025, right-hand piece of 2025 = 25 and left hand piece of 2025 = 20

Sum = 25 + 20 = 45, i.e. equal to the number. Hence, 45 is a Kaprekar

number.

Example 3: 297

2972 = 88209, right-hand piece of 88209 = 209 and left hand piece of 88209 = 88

Sum = 209 + 88 = 297, i.e. equal to the number. Hence, 297 is a Kaprekar number.

- Question:

Write a Program in Java to input a number and check whether it is a Harshad Number or Niven Number or not..

Harshad Number : In recreational mathematics, a Harshad number (or Niven number), is an integer (in base 10) that is divisible by the sum of its digits.

Let's understand the concept of Harshad Number through the following example:

The number 18 is a Harshad number in base 10, because the sum of the digits 1 and 8 is 9 (1 + 8 = 9), and 18 is divisible by 9 (since 18 % 9 = 0)

The number 1729 is a Harshad number in base 10, because the sum of the digits 1 ,7, 2 and 9 is 19 (1 + 7 + 2 + 9 = 19), and 1729 is divisible by 19 (1729 = 19 * 91)

The number 19 is not a Harshad number in base 10, because the sum of the digits 1 and 9 is 10 (1 + 9 = 10), and 19 is not divisible by 10 (since 19 % 10 = 9)

The first few Harshad numbers in base 10 are:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 18, 20, 21, 24, 27, 30, 36, 40, 42, 45, 48, 50, 54, 60, 63, 70, 72, 80, 81, 84, 90, 100, 102, 108, 110, 111, 112, 114, 117, 120, 126, 132, 133, 135, 140, 144, 150, 152, 153, 156, 162, 171, 180, 190, 192, 195, 198, 200 etc.

- Question:

  A Smith number is a composite number, the sum of whose digits is the sum of the digits of its prime factors obtained as a result of prime factorization (excluding 1). The first few such numbers are 4, 22, 27, 58, 85, 94, 121 ………………..

  Examples:

  1. 666

Prime factors are 2, 3, 3, and 37

Sum of the digits are (6+6+6) = 18

Sum of the digits of the factors (2+3+3+(3+7)) = 18

2. 4937775

Prime factors are 3, 5, 5, 65837

Sum of the digits are (4+9+3+7+7+7+5) = 42

Sum of the digits of the factors (3+5+5+(6+5+8+3+7)) = 42

Write a program to input a number and display whether the number is a Smith number or not.

Sample data:

Input	94	Output	SMITH Number
Input	102	Output	NOT SMITH Number
Input	666	Output	SMITH Number
Input	999	Output	NOT SMITH Number

- Question:

A positive natural number, (for e.g. 27), can be represented as follows:

2+3+4+5+6+7

8+9+10

13+14

where every row represents a combination of consecutive natural numbers, which add up to 27.

Write a program which inputs a positive natural number N and prints the possible consecutive number combinations, which when added give N.

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

SAMPLE DATA

INPUT:

N = 9

OUTPUT:

4 + 5

2 + 3+ 4

INPUT:

N = 15

OUTPUT:

7 +8

1 +2+ 3+ 4+ 5

4 +5+ 6

INPUT:

N = 21

OUTPUT:

10+ 11

1+ 2+ 3+ 4+ 5+ 6

6+ 7+ 8

- Question:

A Composite Magic number is a positive integer which is composite as well as a magic number.

Composite number:

A composite number is a number that has more than two factors.

For example: 10

Factors are: 1, 2, 5, 10

Magic number:

A magic number is a number in which the eventual sum of the digits is equal to 1

For example: 28=2+8=10=1+0=1

Accept two positive integers m and n, where m is less than n as user input. Display the number of Composite magic integers that are in the range between m and n (both inclusive) and output them along with the frequency, in the format specified below.

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

Example 1:

INPUT:

m = 10

n = 100

OUTPUT:

THE COMPOSITE MAGIC INTEGERS ARE:

10, 28, 46, 55, 64, 82, 91, 100

FREQUENCY OF COMPOSITE MAGIC INTEGERS IS: 8

Example 2:

INPUT:

m = 1200

n = 1300

OUTPUT:

THE COMPOSITE MAGIC INTEGERS ARE:

1207, 1216, 1225, 1234, 1243, 1252, 1261, 1270, 1288

FREQUENCY OF COMPOSITE MAGIC INTEGERS IS: 9

Example 3:

INPUT: m = 120 n = 99

OUTPUT: INVALID INPUT

- Question 1

A prime palindrome integer is a positive integer (without leading zeros) which is prime as well as a palindrome. Given two positive integers m and n, where m < n, write a program to determine how many prime-palindrome integers are there in the range between m and n (both inclusive) and output them.

The input contains two positive integers m and n where m < 3000 and n < 3000. Display the number of prime-palindrome integers in the specified range along with their values in the format specified below:

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

Example 1

INPUT:

m = 100

n = 1000

OUTPUT:

THE PRIME PALINDROME INTEGERS ARE:

101, 131, 151, 181, 191, 313, 353, 373, 383, 727, 757, 787, 797, 919, 929

FREQUENCY OF PRIME PALINDROME INTEGERS : 15

Example 2

INPUT:

m = 100

n = 5000

OUTPUT: OUT OF RANGE

- Question:

Write a program to declare a square matrix A[ ][ ] of order MxM where ‘M’ is the number of rows and the number of columns, such that M must be greater than 2 and less than 10. Accept the value of M as user input. Display an appropriate message for an invalid input.

Allow the user to input integers into this matrix. Perform the following tasks:

(a) Display the original matrix.

(b) Rotate the matrix 90° clockwise as shown below:

$$\text{Original Matrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \text{Rotated Matrix} \begin{bmatrix} 7 & 4 & 1 \\ 8 & 5 & 2 \\ 9 & 6 & 2 \end{bmatrix}$$