1. Print an Hourglass Pattern

Write a program to display an hourglass pattern with '*' characters.

Input:

The input is the number of rows (half of the hourglass). The number should be greater than 2 and smaller than 20. Other numbers are considered as invalid numbers.

Output:

If the input is a valid number, print out the result diamond.
Otherwise print "Invalid input"

Sample Input:

5

Sample Output:

```
*********
 *******
  *****
   ***
    *
   ***
  *****
 *******
*********
```

Hint:

No additional spaces required after the last '*' character of each line.

2. Ugly Number

Write a program to check whether a given number is an ugly number.

Ugly numbers are positive numbers whose prime factors only include 2, 3, 5. For example, 6, 8 are ugly while 14 is not ugly since it includes another prime factor 7.

Note that 1 is typically treated as an ugly number.

Input:

The input will be a non-zero positive integer.

Output:

Print "It is an ugly number." if input is an ugly number, otherwise print "It is not an ugly number."

Sample Input:

```
25
```

Sample Output:

```
It is an ugly number.
```

3. Sum of Repeated Numbers
Write a program to find out repeated numbers in given 10 numbers, and show the sum of repeated numbers as result. Input: The user inputs should be: 1. Input 10 integer numbers separated by space. 2. \<ENTER\> Output: The result output should be: * Print sum of repeated numbers if there exist repeated numbers in given input. * Print "0" if the there are no repeated numbers in given input.

Sample Input:
`10 15 23 15 55 75 55 15 55 1112`
 	
Sample Output:
`70`

Hint: Array

4. Two NxN Matrices Multiplication

Write a program to calculate multiplication of 2 NxN matrices, and show the result NxN matrix.

Input:

The user inputs should be:

1. Input an integer number N as the row and column dimensions of matrices.
2. \<ENTER\>
3. Input NxN integer numbers separated by space as the first matrix.
4. \<ENTER\>
5. Input NxN integer numbers separated by space as the second matrix.
6. \<ENTER\>

The following numbers

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 represent the matrix

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{bmatrix}$$

Output:

The result output should show the multiplication result in NxN format.

Sample Input:

```
4
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
```

Sample Output:

```
272 304 336 368
656 752 848 944
1040 1200 1360 1520
1424 1648 1872 2096
```

Hint:

1. Array, Matrix Multiplication.
2. The row and column of each matrix will be equal.
3. The row and column are equal.
4. The size of row and column will not exceed 8.
5. See attached file for details.

5. Multiple NxN Matrices Addition

Write a program to calculate addition of multiple NxN matrix, and show the result NxN matrix.

Input:

The user inputs should be:

1. Input an integer number as the number of matrices.
2. \<ENTER\>
3. Input an integer number N as the row and column dimensions of matrices.
4. \<ENTER\>
5. Input NxN integer numbers separated by space as the first matrix.
6. \<ENTER\>
7. Input NxN integer numbers separated by space as the second matrix.
8. \<ENTER\>
9. Input of another matrix if any...

The following numbers

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 represent the matrix

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{bmatrix}$$

Output:

The result output should show the addition result in NxN format.

Sample Input:

```
2
4
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
```

Sample Output:

```
1 5 9 13
17 21 25 29
33 37 41 45
49 53 57 61
```

Hint：

1. Array, Matrix Addition.
2. The row and column of each matrix will be equal.
3. The row and column are equal.
4. The size of row and column will not exceed 8.
5. The number of matrices for addition will not exceed 10.
6. See attached file for details.

6. You can say 11

Your job is, given a positive number N, determine if it is a multiple of eleven.

Input:

The input is a positive number. The given numbers can contain up to 1000 digits.

Output:

The output of the program shall indicate, for an input number, if it is a multiple of eleven or not.

Example Input 1:

```
112233
```

Example Input 2:

```
123456789
```

Example Output 1:

```
112233 is a multiple of 11.
```

Example Output 2:

```
123456789 is not a multiple of 11.
```

Hint

1. You can use **`getchar()`** to get the input.
2. If the difference between the sum of odd digits and the sum of even digits of an integer can be divisible by 11, then this number can be divisible by 11.