

1. Prime Numbers between a range M, N

```
def is_prime(n):
    if n < 2:
        return False
    for i in range(2, int(n**0.5)+1):
        if n % i == 0:
            return False
    return True

M = int(input("Enter M: "))
N = int(input("Enter N: "))
print(f"Prime numbers between {M} and {N}:")
for num in range(M, N+1):
    if is_prime(num):
        print(num, end=' ')
```

2. Check the given number is a Tech Number

```
def is_tech_number(num):
    digits = len(str(num))
    if digits % 2 != 0:
        return False
    first_half = num // (10**(digits//2))
    second_half = num % (10**(digits//2))
    return (first_half + second_half)**2 == num

num = int(input("Enter a number: "))
print("Tech Number" if is_tech_number(num) else "Not a Tech Number")
```

3. Sum of the series $1!/1 + 2!/2 + 3!/3 + \dots$

```
import math
n = int(input("Enter the number of terms: "))
total = 0
for i in range(1, n+1):
    total += math.factorial(i)/i
print("Sum of series:", total)
```

4. Sum of negative numbers until -1

```
total = 0
while True:
    num = int(input("Enter number: "))
    if num == -1:
        break
    if num < 0:
        total += num
print("Sum of negative numbers:", total)
```

5. Count sentences starting with letter B

```
text = input("Enter a paragraph: ")
sentences = text.split('.')
count = sum(1 for sentence in sentences if sentence.strip().startswith('B'))
```

```
print("Sentences starting with 'B':", count)
```

6. Sum of Diagonal Elements in 2D Array

```
matrix = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
n = len(matrix)
primary_sum = sum(matrix[i][i] for i in range(n))
secondary_sum = sum(matrix[i][n-1-i] for i in range(n))
print("Primary diagonal sum:", primary_sum)
print("Secondary diagonal sum:", secondary_sum)
```

7. Sum of the series $1! + (1+2)! + (1+2+3)! + \dots$

```
import math
n = int(input("Enter number of terms: "))
total = 0
for i in range(1, n+1):
    s = sum(range(1, i+1))
    total += math.factorial(s)
print("Sum of series:", total)
```

8. Right Angle Triangle Pattern

```
n = int(input("Enter number of rows: "))
for i in range(1, n+1):
    print('*' * i)
```

9. Calculate Simple Interest Based on Conditions

```
p = float(input("Enter the principal amount: "))
n = int(input("Enter the no of years: "))
gender = input("Gender (m/f): ").lower()
senior = input("Is customer senior citizen (y/n): ").lower()

if senior == 'y':
    rate = 0.15
elif gender == 'm':
    rate = 0.12
else:
    rate = 0.10

si = (p * n * rate)
print("Interest:", si)
```

10. Decimal to Binary Conversion

```
num = int(input("Enter a decimal number: "))
print("Binary:", bin(num)[2:])
```

11. Mean, Median, Mode

```
import statistics as stats

data = list(map(int, input("Enter numbers separated by space: ").split()))
print("Mean:", stats.mean(data))
print("Median:", stats.median(data))
print("Mode:", stats.mode(data))
```

12. Perfect Number Check

```
num = int(input("Enter a number: "))
div_sum = sum(i for i in range(1, num) if num % i == 0)
print("Perfect Number" if div_sum == num else "Not a Perfect Number")
```

13. Integer Palindrome Check

```
num = int(input("Enter an integer: "))
print("Palindrome" if str(num) == str(num)[::-1] else "Not Palindrome")
```

14. First and Second Largest in Array

```
arr = list(map(int, input("Enter array elements: ").split()))
first = second = float('-inf')
for num in arr:
    if num > first:
        second = first
        first = num
    elif num > second and num != first:
        second = num
print("First Largest:", first)
print("Second Largest:", second)
```

15. Square and Cube of a Number

```
num = int(input("Enter a number: "))
print("Square:", num**2)
print("Cube:", num**3)
```

16. Unique Permutations of a Number

```
from itertools import permutations

num = input("Enter number: ")
perms = set(permutations(num))
for p in sorted(perms):
    print(''.join(p))
```

17. Row, Column and Diagonal Sum in Matrix

```
matrix = [[1,2,3], [4,5,6], [7,8,9]]
n = len(matrix)

for i in range(n):
    print(f"Sum of row {i}:", sum(matrix[i]))
    print(f"Sum of column {i}:", sum(row[i] for row in matrix))

primary_sum = sum(matrix[i][i] for i in range(n))
secondary_sum = sum(matrix[i][n-i-1] for i in range(n))
print("Primary diagonal sum:", primary_sum)
print("Secondary diagonal sum:", secondary_sum)
```