1. Group Anagrams Together | Goldman Sachs

Write a program to input a set of words and group the anagrams together. ***Sample inputs***

Sample input-1

```
Enter the number of words : 6
Enter a word : bat
Enter a word : design
Enter a word : toc
Enter a word : signed
Enter a word : cot
Enter a word : tab
```

Sample output-1

```
The grouper anagrams are :
['bat', 'tab']
['design', 'signed']
['toc', 'cot']
```

Sample input-2

```
Enter the number of words : 8
Enter a word : beak
Enter a word : letter
Enter a word : bake
Enter a word : leg
Enter a word : yam
Enter a word : may
Enter a word : gel
Enter a word : eat
```

Sample output-2

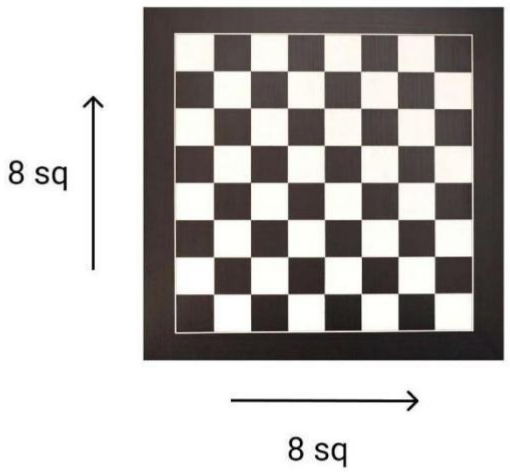
```
The grouper anagrams are :
['beak', 'bake']
['letter'] ['leg', 'gel']
['yam','may]
['eat']
```

Code

```
def group_anagrams_together(words):

        arr = [''.join(sorted(word)) for word in words]
        dict = {}
        for i, e in enumerate(arr):
                dict.setdefault(e, []).append(i)
        for index in dict.values():
                print([words[i] for i in index])
words = []
n=int(input("Enter the number of words : "))
for i in range(n):
   ele=input("Enter a word : ")
   words.append(ele)
print("The grouper anagrams are : ")
group_anagrams_together(words)
```

2. Number of Squares in a Chessboard | Goldman Sachs

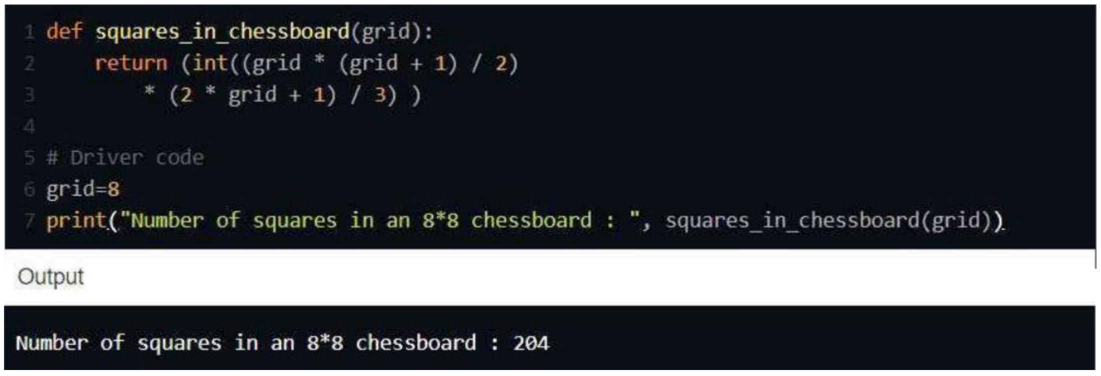
Write program to return the possible number of squares in a 8*8 chessboard.



Explanation

The actual number of squares = 8*8 = 64.
But there are many more different sized squares.
Number of 1*1 squares= 8*8=64
Number of 2*2 squares= 7*7=49
Number of 3*3 squares= 6*6=36
Number of 4*4 squares= 5*5=25
Number of 5*5 squares= 4*4=16
Number of 6*6 squares= 3*3=9
Number of 7*7 squares= 2*2=4
Number of 8*8 squares= 1*1=1
Hence total number of square are
64+49+36+25+16+9=204

Code



```
def squares_in_chessboard(grid):
    return (int((grid * (grid + 1) / 2)
        * (2 * grid + 1) / 3) )

# Driver code
grid=8
print("Number of squares in an 8*8 chessboard : ", squares_in_chessboard(grid))
```

Output

```
Number of squares in an 8*8 chessboard : 204
```

3. Counting Sort | Goldman Sachs

Write a program to input an array of integers from the user and print the sorted array using counting sort.

Sample input-1

Enter the length of array : 3

Enter the element : 9

Enter the element : 0

Enter the element : 3

Sample output-1

Array sorted by counting sort is : [0, 3, 9]

Sample input-2

Enter the length of array :

6 Enter the element

: 7 Enter the

element : 3 Enter

the element : 8

Enter the element :

1 Enter the element

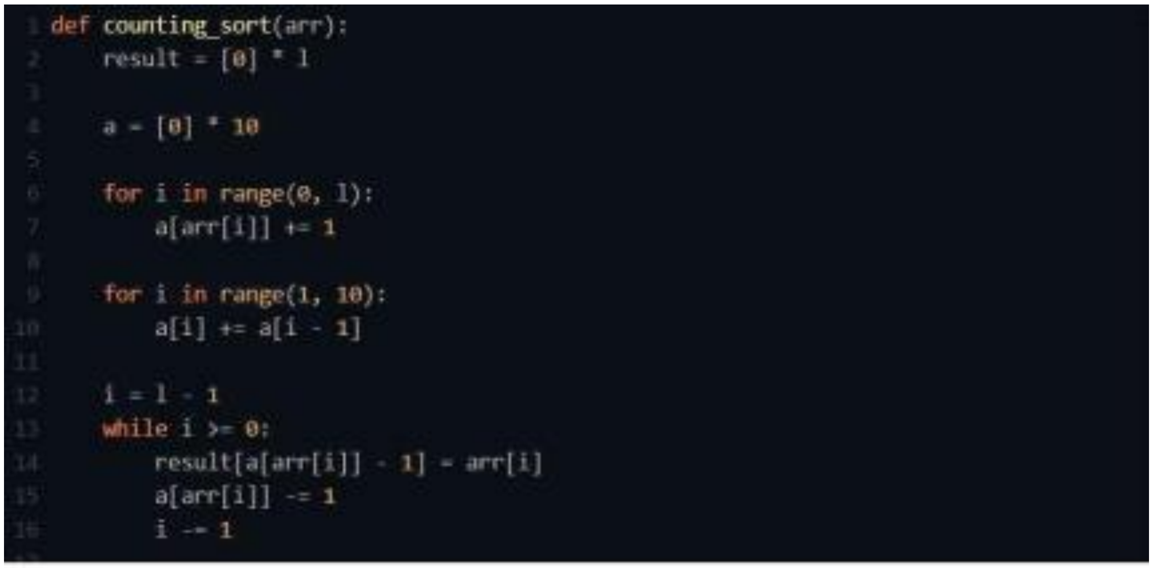
: 0 Enter the

element : 2

Sample output-2

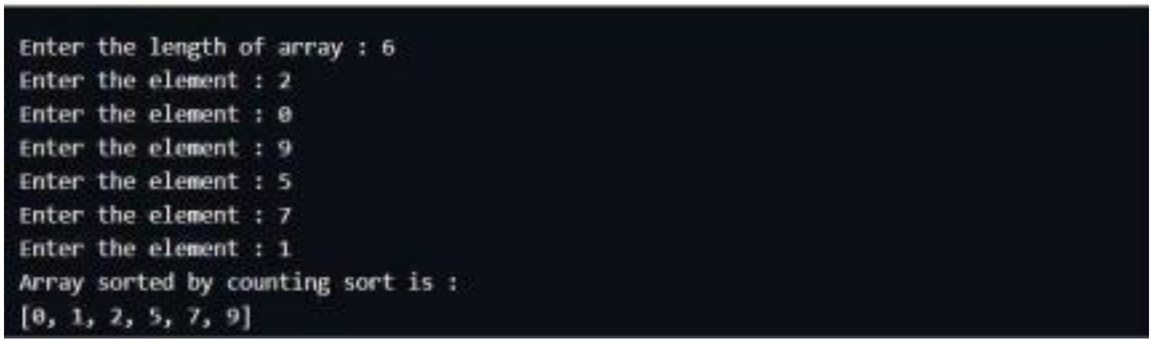
Array sorted by counting sort is : [0, 1, 2, 3, 7, 8]

Code



```python
def counting_sort(arr):
    result = [0] * l

    a = [0] * 10

    for i in range(0, l):
        a[arr[i]] += 1

    for i in range(1, 10):
        a[i] += a[i - 1]

    i = l - 1
    while i >= 0:
        result[a[arr[i]] - 1] = arr[i]
        a[arr[i]] -= 1
        i -= 1
```

Output



```
Enter the length of array : 6
Enter the element : 2
Enter the element : 0
Enter the element : 9
Enter the element : 5
Enter the element : 7
Enter the element : 1
Array sorted by counting sort is :
[0, 1, 2, 5, 7, 9]
```

4. Ugly Number | Goldman Sachs

Write a program to input an integer 'N' and return the N-th ugly number.

Explanation:
Ugly numbers are the numbers whose prime factors are 2, 3 or 5.
For example ugly numbers from 1 to 15, there are 11 ugly numbers 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15.

Sample inputs

Sample input-1

```
Enter the N-th value : 11
15
```

Sample input-2

```
Enter the N-th value : 40
144
```

Code

```
def ugly_number(n):
    a = [0] * n
    a[0] = 1
    i2 = i3 =i5 = 0
    multiple2 = 2
    multiple3 = 3
    multiple5 = 5
    for l in range(1, n):
        a[l] = min(multiple2, multiple3, multiple5)
        if a[l] == multiple2:
            i2 += 1
            multiple2 = a[i2] * 2
        if a[l] == multiple3:
            i3 += 1
            multiple3 = a[i3] * 3

        if a[l] == multiple5:
            i5 += 1
            multiple5 = a[i5] * 5
    return a[-1]
n = int(input("Enter the N-th value : "))
print(ugly_number(n))
```

Output

```
Enter the N-th value : 120
2700
```

5. Compute average of two numbers without overflow

Given two numbers, a and b. Compute the average of the two numbers.

The well know formula **(a + b) / 2** may fail at the following case :
If, **a = b = (2^31) – 1**; i.e. INT_MAX.
Now, (a+b) will cause overflow and hence formula **(a + b) / 2** wont work
Code

```
INT_MAX=2147483647

# Function to compute average of
two numbers def
compute_average(a,b):
   return (a // 2) + (b // 2) + ((a % 2 + b % 2) // 2)

# Driver code
if __name__ =="__main__":

   # Assigning maximum
   integer value a =
   INT_MAX
   b = INT_MAX

   # Average of two equal
   # numbers is the same number
   print( "Actual average : ",INT_MAX)

   # Function to get the
   # average of 2 numbers
   print( "Computed average : ", compute_average(a, b))
```