1.Counting DNA Nucleotides

```
s='TAGTTTAAATAGCTCGTGCATCAGCCGCCGCGATTTCATTTAGTCCCCCATACCCGCCG
GCCAAAGCCGCGATGCTGGGGGCTAAATCATCACACGGCTAGCTACGGACAAAGCGCG
GCCCGTGGTTGTACCCCTCTAGTTGCCACCCCCGAGTAACCTTGCCAGGTGATGCAAAC
CGCTCCTGAGGGATGAGATTAACCGGTCCGCGCAACGTAGAGAGTAGACCAACGAATAT
GGGTTGATCTCAACTCCGCGCATTAGGCAACAAACAGTCAATGCGATTTCACCTGCTAGT
ATATCTTATGCTTATGGCATCACATGGAATTTGGGTAATAAGTCTGTCCACAGCACAGACA
CAACGCTAACCTCGATGTGCAATAATAGCTTGCAACTCGGTAGCCGTTTATCTTGTCGGT
AGAGCGCTTATAGCAAGCTCACACGCTTTCGGGGTTGACTCTGCGCAGCTTACTGACCA
CAATTGGTAAAGTTACGCTTAGAGGCAATAGTGGGAGGCTTCTATGGATTTTTGATATGC
AATATCCATGCTATAGAGCGTACGACCCCGACGTTTGCAGGCGGGTATGTGTTCTGTCCT
TGCGAGGAACTGTGTGCACATCTGCAGCCACTTAAACTACTCGAACCTGATTGGGTCTT
CATTTTGGTAACCGAACCTGCGGATCACATCCCGGGCTTGAGCTTTGCAGTGAACCTAAT
TTGAAGGATGACCGCATTGTGGCTCAACACTGTACTTCGCCGCTACATTCCCATATGAAA
CGAGCACAGACTGTCTCGAGGCCAGGTGAAGAACAGAACATAACTATACTCGAGGTGG
GATGGATCAGCATTATTACAAAATATACTTTGTATTAGTAAAGTCCAATAGCAATGAAATC
ACCATGTATGTCCAAGCGGATCCACCGCGATTGCTA'
A = s.count('A')
T = s.count('T')
G = s.count('G')
C = s.count('C')

print(A  ,C  ,G  ,T)
```

2.Transcribing DNA into RNA

```
Rna=
"GTTGATATGGAACGAAACAGGATCGAGTTATTAAACGTTCCCATCGCGAAAACTTACTA
ACTGCCCGGTTCCTTCAGGCATCGATTGTGGCGATTTAGGCCTGAGCGTTTGTATAGGGG
AGGGGGCGGTTCGTCGCACATGCTACCTACTGTGCATCACGTCTTTCCATAGAAGCATTA
TGATTATCATATATCCGCTTCCCATTATAGCACGGGCCCCGATCCCGCTCCTGTGATACCC
AATTGATAACATTACAACCCCCCCGACCGCTAGTGCACGAGCCTTCCCACGAAGATCTGT
CCCCTTATACTCCGAACGATCTCAACCGATTTCTTATCCCGTACGTGTGTTCCATCCATAT
GACTGACCTCAACCGTAATGACGAATATGGAGGATCGGTGGGTTAAGTGAGTCCCCCCC
CACGTTTGCTCTTACCTAGTAGACATGGGGTCCTACGTCTCTGCCTGATCGCCTTATGTTC
GTCACGTCCCCGTCTGATTGATCGTAATGCAGAAGCTAAGTAACGAGATCTGGGTCTGCT
GCGAAAGACTGACCTTGTTACATTAGCATCGGGATCGTTCGGGTCTTGATACTGCAGGAC
GTCTTTCCTTGGTGCCGTCGGGTACGCGAGGCGAGGTTGCCACTCGGTCATGGTTTCTA
CTATCAGCAACGTATTTAGCCAGAAGTGCTCATTAAGATGACTTTCGTAACTGCACCAGC
TGCTGTCGGAAACCTCTTACAGAGGATACGGAGATCACTAGCGTACCCTTCTTAGCCCAT
CACTGTGGTACTATAGATAGAGACGGAGGTAGTTTAGCGCGTCTCCCCGTGGAATCACG
GTTGAATGTCCGTTGAAAACTCAATCACCAAGTTTCAAAAACCCTTGTAGGTAATTCGG
ATGAAGTGACAGGAGGGAACTGAAGGTCTACATAGCCTCCGTAACACTAGCAACCAGTA
TCTCTAGCAGC"

Rna1=Rna.replace("T","U")
```

```
print (Rna1)
```

3.Counting Point Mutations

```
s=
"CAAATTTCGATTACCGTACGTAAGCCACCCCAGCTCCGCAGCAGCAAACACACTATGTG
CTATATGACCGGTACGTGCCCCACCCTCTTACTTTTCGACCAGTTTACTTGACTTTTGTGA
TCAGAGCAACACTTTGCGGGAGTCGCAGAATAGCCATCCATTACTCTCCACTGGGGCTA
CCTGATGGGAAGGTCTATGGTGATTCCTAGTCCCAGACGAAGAGTCGGCATCAATTCCG
CCTAAGTGAAACTGAGCGTAAATACATTTAATGCAAGTGCAGGTTGGCCGTCATCCGGC
AGGTATATCTTTTGAACCGGTCTACTTGACTCCGCCACTCTACAAGGAGACGAAACGTTT
GTTTGTACGCGCCTGTTAGATGAAGGAAACAGCGGATGCGCCTAAACCCGCAGACCTAG
AATCAGGAGCGACTTCCGATACGTCTGAGCATGAAGAATCCCAACATACCTTACTCATGT
ACACTAATTCACGTCGGGATAGACTAGGTATGGGGGTCAGGGTTTCCGCAGTTTACGGTT
GATGATCCATTGCCCGCCGCGATCCTCTCGACGAGTTCGGCTCCTACCCAGCACTCACGC
TTTAACTTCGGAATGTCGGCCCTCAGTCGAAAGTTACGGAGAGCTAATGTCTTGGTACCT
GAAGGCTCATTGCTAGTGGCAGAGAGGTTAGATGGGTTGCACCGGTGCGGAGGGTTCA
GCCCCTGATCACTAAGTGCGCCGACAGAACACGCGTTGCTACTAACGCTCGCGATACCA
TGGTCAGGTTAAGAGCGGCTTGTTCCACATCTGAAATAACCCGAGCCTGTTGAAGCCCC
TCCCGTTCATACATTATGATCCTCATAGGAGAACCTAAAGGCCCAAGGCGGTCTCAAGTT
ACACCGTCTTAGTGTCCCCTTCCAAATG"

t=
"CACAAAATGACTATCCTAATTAAGCAAACCAAGTAAAATGACATGTGCGAGCCCGTGTG
GTAATACCCCGGTTCGTGACGCACCTACTCTCTTTCTCGCGTGCTTTTACGGTACTTTTCA
TTTGAGCCAATCGACGCGCCACTCCAAGCACACGGAACCTCTACTCTCTATTGTACGCG
CCAGCGGTGAAGGTCGAAGATCGACCCTAGGCCTTGACCACACGTCGCCACGAGTACG
GCTTAGCGGAATGGGCGAATACATATCGTGAATATTCGGTCACATTTGTCGTCGAGGTGG
TGTGTTCTCAGCTGATGCCTGGGGCTAGAAGTACCTGTTCGAGGTCGCGATTTGAAGTC
AGTCCAAACGCGCCCGGTAACTGAAGGTACAACCGGTCATGAGACCTCCGGAAGATCT
TGTATGACAATGGTGTTCTGCATTATCGTAATACGTACAACATCAACATGCATTATGCTAG
TCTCGTAATCAGTCACCGAAGAGACCATGCCGAGTGGTAGGGGGTCTCCCAGCCTAAAC
TGTACATGGACATTACAGCCCGGTGCTTCTCGTCGTACCCTGCTTCCATCACCCAATGAA
GCTGGGTATTCAGATCGTTCACACATATTGGCACGAACGGGTCAGCTACAAAATATGGGA
ATTCGTTTTGTACGGGAGAAAGGGTGACTCTTGACGTGCAGCAGCGATGAGCAGGTATT
GGCTCTTATTTATGGAGAACCCCAGGAGGGCGCTCGCCACGACTCATGTACACACGGTC
ATTTTGAGTGGAAGATGGTGCCGGTACACAACTCAAAGGACGAGAACGTGTCCTCACG
GTGTCCATCGGTAAATTAGGAGCATTCTTGGGCAACCCGCACGTCGCCGCAAGCCTCAA
GATCAGCGGTATCGCTATCCCCTTTAGACCG"

count=0

for i in range(0,len(t)):

    if s[i]==t[i]:

        continue

    else:
```

```
        count=count+1

print(count)
```

4.Complementing a Strand of DNA

```
#include <iostream>

using namespace std;

int main()
{
    string
s="TCCAGCTATCTGGTCAACAACGGATTGCCGCGAAATGAAGGTTTAGGACCAGGACTC
GTGTTCGATCTCGTCGCATTGACGCGAGGCTGAGTGGAGGTACGGGTAGGGAGAGATTC
TCCCATGCTACTACATCAGCAGTGCTGGCTGATCAGAAGAGATGCTATGTAATTTCGTGC
CCGTCACCAGCAGGGCCCCGACAGGGGAATTTTAGCTTGACCTGCAATCTGCCTCTTAA
CGCTCGACGGCGGTGCGTATTGAAATAGCTACCCATTTCAAAGCAATTACAGTTCCCCGG
TGAGTAAGCGCGTGTGCAAGTCAATCACACCGCGATCACGCTCCATCGTAAGGCGTCCG
GACTTATGCTCGCGCTGCTTGCAGGACCACCACGGCTACTTGCGCTTCGAGGAGCGCAT
GAAACGTGACTTCTTTGTGGAGATAGTAAATCCGATGTATGAAGAGTAGCCTGCCCTATG
AGTGTAATGCCGATCCCCTTACAAGCCAGTTTCGGATTCCATGGTCACTAGCTGATGGAG
TCTGACACTAAGGCCTTGTGTAGCTGTACAGCCTGGGAATCCTGATATTGGACACTGGA
GGAAAGGGCTCAGTCTGACAACCCGAATCAAGTAGCATCTATAATGTACACCAGAGAAG
ACCCAGCACCCAACTCTTTGCCACCGTCGACCTTCGGGAGCTGGGTAATTGAGAGTATG
CGGGAGGGGAATTCGCCACCGCGTAGTAGGAAGCAGGACGAACCATTTGGACCAGCGG
CTCAGAGGCTTTATGCACCGCGGCCTGGCTTGTGAACTAGATTCCGCGGTTGCTCGACT
GTAGCGCCG";

    for(int i=0;i<s.size();i++)
    {
        if(s[i]=='A')
        s[i]='T';
        else if(s[i]=='T')
        s[i]='A';
        else if(s[i]=='G')
        s[i]='C';
```

```
        else
        s[i]='G';


    }
    for(int i=s.size()-1;i>=0;i--)
    cout<<s[i];


   return 0;
}
```

5.Compute the Hamming Distance Between Two Strings

s1='CGAGGAACTTTCCGCGGCCGAAACTGTGAAGCTGTAAATCGGGATCTGCGTAAGGG
TTGTAACTATACACGCAGAGGGTTATGTGGCGGATACGGCTATTGCCTACGTTCACACAA
CCTAATCGAACCACGCAGGGGAAACTGCGTGGCATTACATCTTCTAGAATGCTCCGCATA
TTGGGTCCGTGGATATGACATGGTCGCCACCTGGCACCTGGGGTCCCTAAAGAGTACAC
GCAGGGTGACTCGAGCTTCTGTATCACTGAAGCTCGCAAACCCTCACTGACCACGTACA
CGCTGCGAGTATGTGTCGCTGCTCAGGTCACCGTCTCATCAAACAATTAACGTAAGATAC
AACCTCTACGGTTACATGGACCTTAAGTGGACGCTGGGCACCATTTGAGCTCAGCCCGT
AGGATATTCCGAATTGTTCGTGGGGCCCGCGCCATGACGAGATTCCTCACAGAGATGTCA
TCTAGTCGTTCCATTGTCAGGAGATTCGCCCAATCGTGACAGACGAGCATCTATGCCCGA
AGGCCCACACGTCTAGGAGATAGCTTTTTGCGATCAAAGGTAAATTATACAAAGCCCGG
TTAAGTGAATTAGACATGATCGGGTTGAGCCCGCGTTTCCCACTGGATAAGTGAGGGCAT
TGCATCGGTAGGGGGAATGAAACAGACTTTTCCAGTACGCACTTAGCTATGGTGTTTGG
CGACTGAGTTTGGATGAGGACACTATAAGACCTGGATATATCAAGTAGTGGTATCAGCAA
AGACTCTTTCGCCATAATAACAGTTAGCCACAGCAGATTGTGCGCCGATGGGGGTCGTA
GCGCCGCCTACCCCTATGCCTCTTAACAAGCCTACGAAGACGGCATGTCGTGAGCCTGTA
TGTGTCCTCGACTAATTCCGATCTAAAGTCACCCAGGATGCGAGTCACGCGTCGCGGCT
CCGCTGAGTTCTAATCGTGGAGGATCTGAGGAAAGCCGTGGTGGTACATAGCAGTACAA
GATAACACTTCTACTGCAAGTC'
s2='CACAAATTACGGGTACCTGCTCTTTAGAGGGCATGGCTGGTTCTGTATCGCCGAGCC
CCGACATCCCTCTAGCGTATCTATCGGGCTTCCATACGGGTTGTGTGGTACCTAACTTCCA
TGCTTTCCGGATAGGGCGAAACTGGGAGGGCCAAGGCACAACCCCTTAACCGCCACCC
GCAGCTTCTAGCACCGAACCTAAGGGATTAGTTTTTCTTACGAGCAACTCATAAAGTGAC
AACATGTTTACTCGTAATCTATCAGGCACCAGTATCACGGCGGAGAAGAACCATGCGCC
CAGTTCCGAGAAAGTCACGTTGACTCGGACTCACAAGCACAGCGAGGGTAGGTGATAC
GCATCGATCTTCCTAGACATTATACGGTCGCACCAAAATTCTCGCACGAGTCCATTAACT
ACTTATACATATTCTGAAGATTGAAGTCCATTACCACTAATCACACCGAGCGAACCCTCG
CCTTTCCGGTTGCGCATCGAGAGTGTTAGGCGATCGATCTGTGACGTCGTCGTTAGCGGC
CGGGGTAGCGTATCTAGGCGCGTTGCCTTATTACCAGGTCGACTCGTCAACGACGTACAA
TCGCGTGGAATTTATCCTTAGGACTTAGCTACACCACACGGTCAAGAAGGCCCATTTTTA
TCTTTATAAGATGATCAGAGGCAGCAGACGATACCTTTCCTGTGCGTTCCCGAGGGGGG
GCCATCTCCGCTGTACTGTTGATGACATTAATTTATTTTGACGTGCAAACAGATTTCACAG
GTTTCCATTATTCTCAGGGACAGGATCTTGTAATGAAGTAGTCGCGAGATTTCGCGGGGA
GTCAGACTGCAGAGCCTCAGTAAATCGGTCTGGTCCAGCAGCTGTTCGTCCGGTCTCAA
AAATCATGTAAGACGGCAAGGCGCGGCCGCTACCAGGAAAAGCCATTAGATCCCTCACT

CGTATTTTCCGAAATAACCCGTATGGATGTATCACGCATCTCAGCCCGACCGAGAGTCTTT
ATTTTAACTACAGCGCAG'

l=len(s1)
count=0
for i in range(0,l):
if s1[i]!=s2[i]:
count=count+1
print(count)

6.Installing Python

import this

7.Variables and Some Arithmetic

a=865

b=870

ans=(a*a)+(b*b)

print(ans)

8.Strings and Lists

s='1WWcP035pgl0eG4J7GTkcGoiBalomOChS2g8QmynHFp5otjUsLu5egDXykGsTJzPrunellamx
drEGdsnsD7mdxm7JvariegatusDfvzGypuy1DLEwnm2Q5EitREcUolN6j8zYwClvjHAvQO1vKf3l
0mcbTu8U9lB71uBP2DbzVqa0.'

print(s[63:71])

print(s[89:99])

9.Conditions and Loops

a=4806

b=9136

sum=0

for i in range (a,b+1):

    if i%2==1:

        sum=sum+i

print(sum)

10.Working with Files

file = open('answer.txt', 'r')

count=0

for line in file:

```
    count=count+1
    if count%2==0:
        print (line)
```

11.Dictionaries

```
def word_count(str):
    cnt = dict()
    dictionary = str.split()

    for i in dictionary:
        if i in cnt:
            cnt[i] += 1
        else:
            cnt[i] = 1

    return cnt

print( word_count('When I find myself in times of trouble Mother Mary comes to me Speaking words of wisdom let it be And in my hour of darkness she is standing right in front of me Speaking words of wisdom let it be Let it be let it be let it be let it be Whisper words of wisdom let it be And when the broken hearted people living in the world agree There will be an answer let it be For though they may be parted there is still a chance that they will see There will be an answer let it be Let it be let it be let it be let it be There will be an answer let it be Let it be let it be let it be let it be Whisper words of wisdom let it be Let it be let it be let it be let it be Whisper words of wisdom let it be And when the night is cloudy there is still a light that shines on me Shine until tomorrow let it be I wake up to the sound of music Mother Mary comes to me Speaking words of wisdom let it be Let it be let it be let it be yeah let it be There will be an answer let it be Let it be let it be let it be yeah let it be Whisper words of wisdom let it be'))
```

12.Binary Search

```
def BinarySearch(main, array):
```

```
    low = 0
    high = len(main)-1
    while low <= high:
        i = (low + high) // 2
        if array == main[i]:
            return i + 1
        elif array > main[i]:
            low = i + 1
        else:
            high = i - 1
    return -1

with open('rosalind.txt','r') as file:
    File = file.read().splitlines()

main = [int(i) for i in File[2].split()]
array = [int(i) for i in File[3].split()]
List = ''

for i in range(len(array)):
    List += str(BinarySearch(main, array[i])) + ' '

print(List)
```

13.Find a Position in a Genome Minimizing the Skew

```
s =
'CGGTTCCCATTGCAGAGTTTTAATGTAATCCCTAGATTCATGATTTGAGACCAGCCTCTA
GTCAACTGGCTTGCGTCGAGAGTTACAAGCGTTTCGGGTACTACTCTCTCTACAGGCCA
CTTCCGCCTGCCCAGAGGACAGCACCAGATCAGGAGTCAACTCCTGAATGTATATCCCA
CCACATCCATAACATTAAACAAGCGCGGTGTGTGGGAATTATCCGCTGAAACGCTATATT
GCTGGGCATCAGAGACTTACGACAAGAGTATTGCCCGTTGTTCTTTAGCCCGCCGTGCG
GAGACGTTCAGCGCAAGTGCGAAATACGGAACGCATGTTATCAAACAACTGGCTAGATC
ATCCTAACAATTCCTGGGGGGCACCGAGTCGTAACTATTTTGTACGACGAGTGAGCCCG
GCTACTCAGATGACCTTGCCGCATCGTCCGGAGGGGACATAAAAGCGTCCTTTTTACCA
GGCACCGTGTGAGTGCGATATTACACGTAGCGTATCGAGGTTCTACGTTGCCTCCCAGCA
TTGGCCCCCGAAAACTAAGATAGAATTGTAGGCAACATGCGGCGCGAAAGTATGTGAGG
TGCGGTGTCCGTGTGCGCCTGGCGTCGAACTGGGTCTGCTCCGAGAGGTAGCGGTTAAA
ACATGCGCATAGCAGCAGGGTCCTGATGACCTAAGAATTAGGGGCGAGAGTCTGCAACG
TATCAAGTTTGAGCGCAAAGCAAGCGGCCGCTACCGTTCTACCAATTAGATTTGTGTCGA
GGACGACCCGGTTAGACACCTCCAGATAGTTTTACAGGGTTAGTCTATCGTGTCCCCCAT
TAGACACTACGCACGTACCCGCCCTGGCAACACTGACAATGGCAAAATACGATACCAGC
TCACTGTGCCCTAGGGGCACTATGACCAAAATCCGTTTCTGTTAGATGGGGTCGTCTGTC
ATAGACATAGACAGCTCCCGTGTACGCGGAATTAGGGACATGGTAACGAGGAGGCTGTT
TGTGGATACAGCTGTCGTAATTATCACCAGTGGTGTTTGTGCAAACCGAGTAGGGAGAA
ACACGATGCTAGGGGACCAGTATGTGCAGCTGGGTTATTGCCCTAAGAAAGACAGGCTG
CATCGGCGCCACATCCACAGCGCACATCTCAAAGTTGGGGCTATAACGACCTGGATCCC
CGGTGCGCTATTGAACTGGGCTCCCGTCGAGGGTATCAGTTGTTTTTGGTAATGGCATGA
```

GCTAATGGGGGCTAATTTCGCCTGTCCGCACCTAGGTATGGTAGGTCGAAGGCTTTCCAC
TGATGAAATGTTGCACTATCGGCCTGTGTATCGTGCGGAAGTGACCTTGGTGAGTGGGG
TCCGCGGCCTGCTTTCACAGGATACCGTGTTTGTTTGTATGGAAATTGCACTAAACCAAG
ACCCATTGGGTCCTGGTTATACGCAGTAAGTATGAGAAAAGTGCCTAGTAAAGTCATACA
CTGATCTTATCAACTTGTTATATTCGTATCAGAGTACCGAACTAGCGTGTTAAGCTCGCTA
CTCATATGATCGATCCGGTAGCAGTCGCTGGTGAAATCTTTTACCGGGATTTGACTGGAC
AAGGCCGAATACCTTAGGTATTGCAGGAGAGTTGCGAGGACGGTGGGACTGTAAGCATC
TTATGGATTCTGACTACTTGCAAGGATGACTTACCCTCTCATTCATTGGCACGACATCGTA
TAATTATAAAATTTCGTTGTACGAACCGCCAATACCGGGGATATAATCATGCAATGTCGGT
GGACCTCGGCTGGTCTCGGGAGACTTGCGGTCGATGGCGTGAAGTGCCACTATGACCTT
ATTCCTCGAGGGAGGTCCCATATTGATCCAGCGACTTGACTTGTCGTCTACCCTTAAGCT
TTGACCAATACAGCCCTGGATGTTAGTTGGGCGCGCTAACATGATCTTCAGGAAGGGGTT
ACACTGTTAGGGCAAAGTGGCCTCGGATGGTCCTCAGCAGACTTGAGCCCCACGAGCG
CCAAGGCGTGCGTATCACGCAGAACTGATTAGAGCCTCTCCATCATTTCTCACATGTACG
CCCCTCTCTCGTGGCAAGGGGCGTAGCCACGCAGAGGACGGTAACTCTCATGTTTTTTA
AGAGTAAAAGGCCAGCTCTCTCTGGGAGGATGATAGACGGCGACTGAGAAAAGCGGGA
ACGTGACGCACTACACATCCATGCTTGTCTAGTCCATACGCGCCTTTGCGAAAGTGCACA
AGTTGATGACCACTCCCTGTTGGGGAACATGTGCAAGGCAGACTATTGGCTTGCACTAC
GAAAAAGCAACGCGCCCTGAGATTTCAGATAAAAGGCTCCGCTCAAGCTGAATGATCA
GGAATACCCTACCACCCCATGAGAGGGACCGTAGTGTAATGATCGGCTGCTTCTACCTCG
TCTAAAAGCCTTCTACGATATTACCGTCATTGTACAAAGTGTTCACGAGGATCGACCAAC
GTTAGGACATACGTATGCAACGACCCGCTCGGTACGGTTATCGCGGTGGCGCGAACATCT
GAACTCAGCTCTCCGAGCTTAGGCACGCTGGACTCTCCAGGCTACTCTTGGGTGTGCTT
ATGGCAATGGGTTGGCGGGTGTGTGTGTTTCCTCGACAAACACCAACAACGTTTCACTT
TATCGTCCTAGCTATCATCTGTTGTATGCGCCTGATCATAACTGAGACGACCATGCGGGCG
ACCAATATCCGCTATCTGTCCGAGTATGGTAATAAGGGCGTAGGCGCAGAGGTTCCCTCC
AGACGATGCGTTCAGCGTGAACCGGGTGCTCCCCCTTCTAACGCAGATCATTTTGCTAA
AAGCTTGTGATCAACCATGCCAGCACCTATATCCTAGCGTACCAACGTTGTCTCCATTCC
TCGGCGACATTACGAACCAATTACGTACCGCAAGAAACGTCCTCATCAAATGAAGTTAG
AGCTTTGGTAGTTTTCAGCTACTCAGGATCGGCCGTGGCAGTGCAATGCATGAAGTTATT
ACGGCGTTCGCATTTGGTGGACAAGTAACCGCAGACTAAGGTCACCTGCTGCACGATGC
CGGGGACTGCGCAGAGGCGAGCGCCATTTTCGACACAAGAAAAGGAATGTCAATTCGG
AGAACAGCGCAAGCAGAGAAAGGGCCAGCCGAAGCCTCCTATTCGTGTTGACCAAAAG
TGCATTTTCAATCAAGAACTCAATACCCGTAGCCGTTATGCTCCGGTACTTAGTGCTGTG
CCCTTCGTGCTGGCGGCGAGGTCAGTTAACCTCTCGGTTAGGTCGAATCGAAGTGGTAG
AGCGTTACAGGTGCTGCGATCTCGAGGTTTCCGTGATCGCTGGCATCGGACTATCATGCG
GTCCTCAAGCCTACTGATACTGCCTTTCTTGAATGAACGGTGAGTTCAGGCCATCTTCCA
TCTTGTCGGCAAGATTGAATTCACGATCGGATTTACTGCCCTCTCAGAACACATGTCTTG
CTCGTCTCGACGGCGCGTTCGTTGAGACATACACGATGGGCATATTTCTGGAGTACCTGG
TTTCGCCGTTACTTCCCCCCGCTACATAACACAACATAGCTCGACTCGGATCAGCGTACA
GGGGGTTATGCGTAGCCAACATCGCACGGTTCACCAGAAGCGAGTTCTGGGAATCTTTT
CGCTTTAACGTTGTCTTCGTCTCGGAGTGGAGATGGTCCGATTAAAATCAGGTCACAGTT
TCCCAGATATGAAGCGATTGACTCAGGAGTTAGTGCAACTTATAAGCTTCAGAGCATGA
AAAAAACACAGCGCTTCTATTCTTGGGAGAGCAACCTTACTGTGCCGCAAGGCTACGGC
GCTAGAACCCCTCGCATTTATACACTTCTGTTCCATGTTGTTGAGGCGGTACTCCGCCCTT
TCATCAGCATTCGCACTCTCTGCTGCATTAGATTTGGTCGGCAACAGTCCAACTCCCGTT

CAACCGTGAGATGCAGGGCATGTTGGCTTCGCCTACACGTCCTCATACAAGTAGCTGTA
CGTATCCATTAGCACTAGGTCGGACACATGATGCGCGTGAACCTACTCTAAGAACATCCG
ATATGACAGTTGCAGGTAAATGTTCTCGAGATTCGAGGATTCTCGGAGCCTATGTGTAAG
TCGAGTCGTACTGCTAGGACCGAAAGGTAATAGTAATTTATCCGCCATACAAAATGGCCG
CCCTGGCGTTGGAGAAGCGCCGAGTCCACGTTTAACGATCTCGTTGGTCTAAGCAAAGC
ATGGAGGCCTCAGATAGACGACCAGACTGGAGGGCACGAGTTTTCCGTCAATGGGGCTT
CTTGCCAGCCAGTTTCTAGTGCGTTGAGACTTCGCCTGTTGGGCAATCTCAATGCCTCCA
AGGAGATGGTACTAAACCAGCGCGGATTTCAGTAATCGATCGTCGATCAACATAGTAAG
GGCGTGCGTACGCTGCCTTGATCGACCAATACTCTCCTGAAGTTGCGGCCGCGTAGGTC
CGACGTCTCTTGGTCGGCAGACCGATTTTCGGTGCTAGTACCTACGTCTCCGGGCTCAAC
CGCCGTAGACCAGGAGTCGCAGATGATAATAAATAATGAACGCAACGCCATTTTCTGCC
ACCTAAACTAATAGCCTCAAGTGGCGCACCGGTGGGTGGACAAGTTCGGGGCGCTCGG
CGTACAGTTCGTATATCCGCCCACAATTCGCAAACACTTGAGGGAAGTAGGACGGCTCA
CAGGTAGGTATACATTCCTCATCCTGATAGTCCGGAGCCAGTTCCGATTTACGTCGAGTA
GTGTCTCCCGGGGCAGAAGCAGCCCGATGCCCGCGGAACAACTAAGTCCTTATTTTCGT
ACCTAGGGCTCTATACATTTATCAGCCACCAACACCTGGTGGCCGTGACGACTAGCGGTC
CACAAGCAAACGCTAATAGCGGAATAGTTAGTAAATCCCCGCCTTTCTTTCTTGATCCAC
GTCGCGGCTGAACCAGACAACGCCTGCGTCTCTATAGTTTGCTCACCGGAAAAAGAGG
CGACACCATGGGTAGCTACCGAAAGAGCCACAGTATGATGCCTTGCCAAACAAGCAAG
AGTACAGGTGATTGGGGATCGATGTAGTAAAGGTAGTCCATCAATCTGGCGGTTCGGTC
ACTGCGTCTCTCACTCCGACTCCCTCCCTAACGGAGTAGCGAACCAGAGCCCTAAGAGC
ACGTTGCTGACTGGCTCTAATGAGAATCTAAGACGTGACCCTCCTGGGTGCAGCGTAAA
TCTATGTCAGTGTGGAGTCGACGTGGCATTTGCCAGCACTAGGCCCGGCAAGGCCTCCA
AGTGAGCGGGATCTATACCATACCATATCTTTAGTTGTTCTATGCCTGAGAAACGTGCTTC
TAGACCTCACCCACCTAATTCGTTCACTACTCAGTACCGAAGGAGGGAAACCCTACCGT
TAAGTTGATTAGAGATGTGTACCACCATCGGGTTGACCATGCTGTATCGTTTTACCCCTGC
CAGCTCCAGGATTGTAATCTACCTAACCTGTGGGAATGGTGCCTCCACAATTGTTAGAAA
AGTTCCAACGCTTTTGATACTGCTCGTACTAGTCGGGCCATGTAAAGTCATGTTGATAAC
GAGTCTTCACAATAAACAAAACAAACTGCGGCTGTGTGATTGTATATCAGGAGTCGTTG
CCTTGACCAGGAAATATTGTAACTGCCACCCATATTGCGGACCGTTACCAAGGGTGTGGT
AACAAGCAGTATATATGGATCATTGTCGTGAAAGAGTATAATTTCGCGTGACGTGTTACT
GTGGGTAGTCGTTCTCACTATGGCGGTATCTAACCGCGTCTATCGGGAACCTGGTGGATG
AAAAATAGAACGCGGAGTTATCCAAATTTTGAGAAAAGCCCGCTATGTAGGGCTACGCA
AATGGCTAGATAGCAGAGTCAATCAATTTATACGAGAGGTCTTACGAAGATAGTAGCGTG
ATGATCTAGGCTTCCGGAATTCTGACGTTGAGAGGACCGCGGTTCCCGGGCTACCGGCA
ACGTGCTTCTTTGCCATACGTTGAGGCGAGCTCTCGTTCTTACTATTGGTTAAGAATGAA
GGACCGAAGTTTTACTCAGGACGAGGGGCTACGGCCCGTTTTCCTCCAAAAGGATGTTT
TGGCGCGTTGTCATAACGAGTCGGGCGGACTTCCCTTTATGGCACAGCCGACTAACTCT
GAACTGACTGCCCGGGGTTCAATCTACGAGATTATAACGCAAGTCCGAGCTTTATTGACT
CCTGAGGCCGTCGTAGCCAGTCACGTCATGGACCTCAACATGCACGCGTGAACCTAGCA
AGTGGTTTTTCGGGGGAAGAGCTGGCTCTGGAGATATAAGTAGTAACTTTTCGGAACTTA
TTAAAACCAATAGGCGTATGCACTACATTGTGTTAGTGACGAGGGTTCGTTTAGGCTTGG
CACCCTCACCGCGGTACGAGTGTTATACGCCTCTGTAATATGTAGACTCCCCCGGCCAAT
CGGTTCATACTGCGAACCCCACCTGATCATGATACTTAACCAACTCAAGGTCTCTTGGTT
TACTTCTGTACCTGGGTGTCTCACCTCATGGAGCCATGCGTCCTTCCCCTCTCAGGCGAT
TGCGTTTGCCGCCATCCGCTCGCAGGTGCCACCCTGCGGATTGACCTGGTACCAGCTGG

GTTACGGGGTGTGCCACGCCCTGGTTCGTGTTTAGTGTAAGAATCTCACATAACACATGA
GATCGTCTTGGGCCTATGTTTGGTAAACTAGGAGATATTACTGGGATGCCCGAAGAAGCA
CCTCTCTACCATCCCTGTCAAAAAAAAGGAGCCAGAACAAGCATGGAGAGAGTGTTTTT
GCCGATCCCGATGGTACCGGACATAGCTTCTTTTAGGACCTGCTGTGCACGAGTAGCGA
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CTACCGCTATCACCCCACGTTGAGTAGATCATAAGTTCTTGCTTCTCTTACACTCACCTAG
AGGTTACCTGGGTAACCAGGGACCAGCAGAAACAAGCCCTTCGTCACACATGTGAGTA
CTCAAGCAAAGGGGTTGCGGATAGAGAACAGTGCTCTAGATAGTCAAAGAAGGCACGG
GATCCTTTAGAAACATGAACCCATCTAATAAAGCGAAACGTACACACTACACCGTCTCCT
AGTCGACTGGGATGGCATCGCTTAGTGGTTGCCCATAAGCTGTAGTCACATCGCTCACAC
AGTTCGGTCGTTCTTAAATGCCAAAGGGAGAGCAGTACCGCTGGAGTTCCGGTCTCTCC
GCGGGCACGGGTATAGGGGAACCAAAAAGAGTTCAGTGTAACCGAATTATTATTGCCAG
TACGGATTAGTGGTATAACACTGGTCGCAGTCCGGTATAGAGTGTTTTTGGCACAGTGAA
AGCATTGCGCGATGGCTGGTCTAACAATCATTACAATGAGTCCTGGTGTAATCTCCTTAG

GCGGTTACAGATTTGAGAGGTTACCAGCCAATGCCTGATTGTCATAACCTAGAACACGG
AGGAACTTAGACATTTGGAGGAGGGTCATTAGGAGGTGGGCCCAACTTTAAGCGAAGA
AACCTAACGCATTAGGTAACCGCGAATGCATCTTACCGGTCTCCTCACTCGGCAACCTGG
TTGGCACGCGCGCCCTCTTTACTAGAG'


def skew(s):

    c = 0

    g = 0

    min = 0

    List = []

    indx = 0

    for i in s:
```

```
            indx += 1
            if i == 'C':
                c += 1
            if i == 'G':
                g += 1
            skew = g-c
            if skew < min:
                l = [indx]
                min = skew
            if skew == min and indx not in l:
                List.append(indx)
        print(List)
skew(s)
n = 7172
k= 11
def Letter(n):
    if n == 0:
        letter = 'A'
    elif n == 1:
        letter = 'C'
    elif n == 2:
        letter = 'G'
    elif n == 3:
        letter = 'T'
    return letter
```

14.Computing GC Content

```
from __future__ import division
from Bio import SeqIO
File = open('gc.txt', 'r')
for line in SeqIO.parse(File, 'fasta'):
    count = 0
    total = 0
    print(line.id)
    for i in line.seq:
        total = total + 1
```

```
    if i == 'G' or i == 'C':
        count = count + 1
ans = count/total
print(ans*100)
```

15.Insertion Sort

```
#include <bits/stdc++.h>

using namespace std;

int main()

{

    int arr[] =
{ 18,25,32,139,168,226,266,291,311,462,469,509,572,579,618,625,643,714,727,768,775,800,878,8
85,944,951,977,1215,1222,1255,1262,1318,1342,1412,1439,1484,1491,1506,1513,1613,1650,1683
,1760,1894,1914,1983,2010,2028,2066,2083,2092,2162,2169,2216,2356,2420,2427,2472,2487,249
4,2517,2644,2699,2794,2801,2816,2823,2830,2907,2914,3001,3008,3090,3097,3104,3111,3132,31
39,3163,3289,3358,3365,3438,3445,3501,3575,3582,3597,3613,3703,3710,3739,3828,3854,3941,3
948,4014,4058,4084,4108,4132,4173,4222,4314,4353,4373,4380,4423,4430,4454,4483,4545,4585,
4592,4607,4653,4672,4687,4725,4732,4739,4746,4753,4788,4795,4891,4970,4977,4992,5023,503
0,5037,5056,5071,5088,5162,5182,5189,5196,5223,5279,5294,5328,5335,5350,5386,5393,5400,54
35,5499,5540,5569,5576,5583,5590,5631,5638,5645,5664,5671,5688,5713,5736,5829,5859,5885,5
892,5923,5930,5937,5944,5992,6015,6057,6140,6165,6172,6179,6194,6212,6257,6292,6311,6392,
6418,6446,6462,6513,6591,6617,6762,6779,6837,6902,6938,6959,7028,7035,7102,7109,7119,712
6,7183,7313,7353,7382,7402,7456,7484,7511,7518,75488663,-82764,-
39235,16273,85542,66331,88694,-51649,27603,86436,53073,99123,56107,-83397,71307,-54019,-
39379,72432,-72788,77330,26606,-3435,-19638,-57317,84210,59535,53788,-87880,-11127,-
9432,61759,80427,94083,-89952,-22992,5344,-81246,-10896,99082,35064,-77104,38405,69551,-
86965,-52966,-61905,71241,89026,22161,-64268,6194,-20446,-84333,-
92968,17359,80235,22743,35740,83187,95849,-24399,30652,-4131,-45647,-
17745,78986,40423,31763,30687,66076,-50867,-62186,62678,94531,-20257,-41632,-
66702,31813,81000,-83446,-1258,57296,-6699,-60770,-8714,-98030,-40359,-28471,-
61939,44251,15026,30661,-95,-48872,-86198,72250,-28618,-59299,-34771,91155,-
53115,25322,11746,49663,-86793,-16126,-8437,-42789,12633,29250,-55502,57133,14020,-
65602,13165,-68605,-8472,8202,-59971,-76704,-77738,-85995,-75936,23200,-13912,-17976,-
72262,57643,-45623,-7936,-85400,18106,63476,-96718,-19621,51202,6339,-
43866,22143,68256,55998,-78123,-61543,93454,-77215,68197,2694,-1391,29248,-55474,-96532,-
65903,81825,61590,-14952,24347,-65397,-65595,-11977,-26335,54373,-7807,-41516,-
97813,41171,-13116,37135,-33880,3836,90810,88115,-77967,-47266,2192,-15357,10112,-11097,-
1188,-99525,-87127,66856,-92942,96158,15020,-
21747,407,1053,66550,87000,83547,94765,15402,-49857,-51649,-80257,67974,-94687,-71893,-
27649,46292,64296,-52105,13036,-76376,-53581,-29157,-63796,-73057,-14067,-
12398,91708,92675,26692,-45710,-47607,-21613,57221,74949,58851,2193,-6451,-
26241,69227,55278,49275,-86008,75622,-29650,26737,-67186,-75446,52204,-12644,-37731,-
45547,-39678,53701,-62214,17778,-56756,-95000,886,71655,57800,43955,25920,21904,-
```

```
84958,66493,-84703,-7769,-73310,30620,-94186,59693,-62477,-94178,-34110,-93486,-
70866,39540,82258,-32672,74902,-60233,14835,54899,62359,30149,477,25275,-75241,-
76660,86301,61779,53516,31228,69569,-57211,83156,80682,47099,-75866,-70966,-51701,25267,-
83994,-81408,-82086,-78069,15153,-59991,31090,35798,-59622,-1311,-96215,-92950,67309,-
12446,-48875,-40370,34676,-98835,3359,-30193,-95855,-27963,7011,-48450,5101,9082,-
82567,21578,-29369,24534,-80612,-49352,-52819,3311,90822,83130,41853,92712,73791,-
66805,48562,63265,-39989,56551,-60501,42733,14979,62688,51510,55833,87573,97777,-
96508,10038,48281,89428,-50995,86901,83845,-652,84251,58689,24902,82349,-5472,-637,-
80396,-63471,16957,-70237,42933,95352,-56454,80070,-76698,87040,-9393,-63766,-
98001,21178,-79616,-59847,31382,64267,59605,9599,14334,41763,59712,-48687,-55555,-25957,-
56294,-40899,50392,-83039,91341,-43173,-67610,-36807,-69398,54121,14515,-53193,-60811,-
71088,-97245,94128,54491,-28818,5768,-7109,76144,93458,-25464,-91296,74707,15250,-
57961,39352,-48427,23607,84464,-82986,15158,-6068,60054,39388,96238,-30856,50378,-56658,-
66648,-37054,-42343,49484,44024,3225,23325,-78284,83911,-
80762,7346,43088,47537,37034,68351,-1657,36578,95982,-14150,-97989,-29712,95768,-
44147,9329,-65467,92810,-74175,76162,3319,-5931,-44869,43568,21079,44268,61369,67831,-
19256,35279,57079,-93301,-58557,-66316,4162,-96141,-42248,1291,18175,-
70479,77789,40566,63690,73797,-94067,10639,-42069,-51479,98200,49468,-56872,-702,-
28135,74585,57831,-59114,43659,66930,23684,-75990,88819,-1442,-91996,87858,15701,-56639,-
83597,-8101,-48980,-14550,-89467,-69086,-64535,29449,-30958,59358,81312,-82078,-65176,-
72781,-48968,-49369,44477,36218,85494,-74384,-99298,75287,-49716,-33677,-47966,-68940,-
97678,-23038,82250,-93088,-50731,-39185,54448,-27877,61178,93920,-22395,63932,-
41638,23010,-26176,62417,56105,39526,-79331,11851,-29248,58541,81024,88112,-
23328,87489,51821,89097,51479,67017,-92813,72724,52282,-71560,71405,-92584,31144,27945,-
54382,44694,56837,-17241,66933,-79575,-93091,-98036,60072,29861,46367,-4812,-
84336,65689,12293,10305,-25117,59198,49150,-65486,-16625,35383,74086,-56496,107,-41793,-
66739,-15187,-60733,-49654,60937,90788,-76800,39774,43568,70933,-54972,-
33856,82552,95117,-44989,2283,28172,19633,-60065,-90337,-17602,-56796,-12289,-
77399,26620,87269,-46356,25960,26959,-38108,1719,-28921,98419,37986,-88189,27628,-61925,-
6384,-87193,60215,-88622,-48361,-99674,-35392,81306,71930,-24651,22850,37871,-
25162,53223,53827,41211,-97734,40960,72124,-21797,-724,17879,7200,87303,-30,65469,-
52510,96545,1304,82029,-6499,-6527,-22002,39307,-43414,74424,55594,18367,-4174,4098,-
22299,-318,-96715,-29462,14530,-99093,-337,-32381,-38103,90000,78427,-87022,51111,-
90734,39445,93397,94736,61710,-62517,-45978,46016,-17110,-58844,-58470,-
62529,67751,76853,-45563,-35904,-46556,-73889,31273,90480,-97164,-45970,-
4763,28258,46132,5486,72339,-18264,-70901,15120,-31724,-10250,5599,-37023,5334,-59838,-
5754,-9338,94096,-3084,76528,-58050,50513,54683,-87959,38920,11806,77033,73457,15151,-
35030,-98563,-32802,95442,-49114,-87927,-16980,-65870,89211,24376,-54012,-
70486,5117,13360,43457,25543,-18768,16188,86350,-63419,-77546,65398,72450,-75196,93698,-
52876,8214,-11922,55103,-68766,25376,-44256,84075,-57447,-80141,67167,-53055,1607,-
3599,16502,-46044,-53726,74516,71519,-25020,-89925,-20955,69900,-
4838,18202,68884,227,57656,-47797,-25142,-37308,-19691,-25632,-39997,-
74114,34467,48962,2989,-43610,53493,65297,86674,-8800,12191,9421,78725,90498,-
22914,12820,41500,73461,78033,8611,92812,-87228,25250,76879,34712,29449};

    int n = sizeof(arr) / sizeof(arr[0]);
```

```
  int i, key, j,count=0;
 for (i = 1; i < n; i++)
 {
     key = arr[i];
     j = i - 1;

     while (j >= 0 && arr[j] > key)
     {  count++;
         arr[j + 1] = arr[j];
         j = j - 1;
     }
     arr[j + 1] = key;
 }
 cout<<count;

}
```

16. Implement Number To Pattern

```
n = 7172
k= 11
def Letter(n):
    if n == 0:
        letter = 'A'
    elif n == 1:
        letter = 'C'
    elif n == 2:
        letter = 'G'
    elif n == 3:
        letter = 'T'
    return letter
```

```
def Number(n,k):
    if k == 1:
        return Letter(n)


    indx = n/4
    r = n%4
    ptrn  = Number( indx, k - 1 )
    letter = Letter(r)


    return ptrn + letter
print Number(n, k)
```

17.Implement Pattern To Number

```
s ='GCGACTATTACCTATCTCCGCCAAAGG'

def num(s):

        i = s[len(s)-1]
        prefix = s[0:len(s)-1]

        if i == "A":
                j =0
        elif i == "C":
                j =1
        elif i == "G":
                j =2
        elif i == "T":
                j =3

        return 4 * num(prefix) + j

print num(s)
```

18.Compute the Probability of a Hidden Path

```
s = "AABAABBABABBBBBBBAABAAAAAAAAABBBABABABAAAAAABBBBBB"

AA = 0.596

AB = 0.404

BA = 0.358

BB = 0.642
```

```
sum=1

for i in range(len(s) - 1):
    if s[i] == 'A':
        if s[i + 1] == 'A':
            sum=sum*AA
        else:
            sum=sum*AB
    else:
        if s[i + 1] == 'A':
            sum=sum*BA
        else:
            sum=sum*BB
print(sum*.5)
```

19.RNA Splicing

```
from Bio import SeqIO
from Bio.Seq import Seq
from Bio.Alphabet import generic_dna

List = []
File = open('C:\\Users\Binodon\Documents\sampledata.txt', 'r')
for i in SeqIO.parse(File, 'fasta'):
    s = ''
    for nt in i.seq:
        s += nt
    List.append(s)
File.close()
seqnce = List[0]
```

```
List2 = List[1:]
for i in range(len(List2)):
    seqnce = seqnce.replace(List2[i], '')
seqnce = Seq(seqnce)
print(seqnce.translate(to_stop=True))
```

20.Compute the Probability of an Outcome Given a Hidden Path

```
s = "zxzzzzzxyzxyxyxxyxyxxxzzxxzxzyxxyzzyzxyzxxzzyyyxzz"
t = "ABBBBBABAAAABABBBBABBAAAAABBBBBBAAABBABBBBBABABAAB"

AX = 0.406
AY = 0.365
AZ = .229
BX = .246
BY = 0.38
BZ = 0.374

total=1

for i in range(len(t)):
    if t[i] == 'A':
        if s[i] == 'x':
            total=total*AX
        elif s[i] == 'y':
            total=total*AY
        else:
            total=total*AZ
    else:
        if s[i] == 'x':
            total=total*BX
        elif s[i] == 'y':
             total=total*BY
```

```
    else:
        total=total*BZ



print(total)
```

21.Generate the k-mer Composition of a String

```
k=50

s='GCACAGTTTAGAGTGGTTGTACCTTGTAGCGCATCGGCGCTGAACTGGCGAACTGTA
ACGCCTAGCGCCCATGAACCGTGCACTTTCAGCAGGGATTCCTCCTTGACACAAGCTCT
GAATAGGAAAGAGTACAATCTTCTGACGTTGCGAACGGGCCCTGTATAAATGATTGCTAT
CCGAGACCTCTGTGAAGTCTTCTCAGCAAATATTCCTTGAGTATGAATGTAAAAGGGGTT
AACGCGCCCCGCCCTTTTCATTATAGATTGGCACCGCAGCGCTCTAGAGGGAGCACATAT
CACAGCATTCTCAAGCCTCTACGGATGTACGCTACCTCTGTCTAAGCTTTATATAGGTGTG
TGAAACGGACCCTGTGATCGCGGTATATAAGCCCGTAAACTTTGAATTGACGTCCAGTTG
GTCTGACGCCATGAGATCCGTAGAAGATACTCGCGCTACTCGTATGTTAGAGCTAGTACA
CCGTGACCTGTCGGGTATCACAATCTTCTCACACCAGGTAGATCAAATTGTATGCGCGAA
CGCATCAACTACTTCTTATTGATGGACCTTCACTGCCGCTTGTTAGTGCATCCACGCGAAT
ATGCAATCCGAGTGCCACTCCGAGACAGGCCCACGATAGACCCTAAAACCACCCCCGTA
CCTTTGCCCTATGCATATTACCCCCACATAGCCTATGCTGCGCAGCGACTGACTCACAATT
TGACTATGATCTCCCACTTTGCAAGTTCACGAAAATCATGACAACACATCATCTGAATCG
TTGAAACCCTTACATAAAAAAGAGACCGTCTAGCCTAGGAGGAGCGTAGGTGGGTTTGT
TATAGCGAGTGCGGCATTTGCCAATCGTTGGTACCCCTACACAGAGGCATATTGTCATCC
ATATTGTAGCTTAGTGTACCATCGAGGTTCTCACCGACGCTGACTCTTTACGTCCCTTTCT
TCACGTAAGATGCCCTAACTATAAGAAGCCGCGAGCCAATAT'


List = []

for i in range (len(s) - k + 1 ):

        List.append (s [i : i+k])

List.sort()

for val in List:

    print (val)
```

22.Transitions and Transversions

```
from Bio import SeqIO
```

```
f = open("C:\\Users\Binodon\Documents\sampledatatrans.txt", 'r')
input = list(SeqIO.parse(f, "fasta"))
f.close()
s = input[0].seq
t = input[1].seq
temp = 0
trav = float(0)
for i in range(len(s)):
    if s[i] == t[i]:
        continue
    elif s[i] == "A" and (t[i] == "C" or t[i] == "T"):
        trav += 1
    elif s[i] == "G" and (t[i] == "C" or t[i] == "T"):
        trav += 1
    elif s[i] == "C" and (t[i] == "A" or t[i] == "G"):
        trav += 1
    elif s[i] == "T" and (t[i] == "A" or t[i] == "G"):
        trav += 1
    else:
        temp += 1
print (temp/trav)
```

23.k-Mer Composition

```
import rna

k = 4
s = kmer(['A', 'C', 'G', 'T'], k)
s = rna.FASTAreader("kmer.txt")[0]
d = []
for i in kmers:
            d.append(patternCount(s, x))
```

```
List= ""
for i in d:
	List += str(i) + " "
print(List)

def kmer(s, n):
	if n == 0:
		return [""]
	List = []
	next = kmer(s, n-1)
	for i in s:
		for j in next:
			List.append(i + j)
	return List

for i in kmers:
	d.append(patternCount(s, x))
List= ""
for i in d:
	List += str(i) + " "
print(List)
```

24.Rabbits and Recurrence Relations

```
#include <iostream>

using namespace std;

int main()
{
    long int n=35,k=4;
   long int F1=1,F2=1,Fn,i=1;
```

```
    for(i=2;i<n;i++)
{
    Fn=F1+(F2*k);
    F2=F1;
    F1=Fn;

}
cout<<Fn<<endl;
    return 0;
}
```

25.Finding a Spliced Motif

```
from Bio import SeqIO
temp = 0
List = []
sqnce = []
File = open('C:\\Users\Binodon\Documents\splc.txt', 'r')
for i in SeqIO.parse(File, 'fasta'):
    sqnce.append(str(i.seq))
File.close()
s = sqnce[0]
t = sqnce[1]
for i in range(len(t)):
    for j in range(temp, len(s)):
        temp = temp+1
        if len(List) < len(t):
            if t[i] == s[j]:
                List.append(temp)
                break
print(*List, sep=' ')
```

26.Translating RNA into Protein

rna='AUGGCGGCCAUGAUGCAUACAGUCUGUGUGGUGGGCCGUUUACACAUAUUCAC
AGUAAUCAAGAUCCCGAGACGAGUAAUUAGCGACAGCCGUAAUGGUUCCAUAGGAC
ACACGAAUAAUGCGCUAUGGAGAAUAGAACAACGUAGGCUUCACAGGUGGAAAAAG
GACAAUCAUGAGUAUAGGGGGCUCGAUAUCUCCUGGACUUACCCAGCUGCGAAAAC
AUCCAUCAAGAGUUUCUCCACAUUCAACCCCAUCGCAUGUUUUCGGACGUACUCUUC
CCGCCGAGCGAAUCCCGUCGCUCUCAGAUAUCCCCUAUAUAAGAUGCUGUUCACCGA
AGGUAGCGCCAUCUUCACGUCGCAGCUGUUAAGUUUGCACCUGUACUAUGGUAGGG
GAUGGAUAUCUGUAACGUACUCUUGGCGACGAACCCAGUUUUCUGCGAGACGAGGU
CAUACUAAAGCCUUUGUGCAGCGGCGUACAUGCUGCAGUCGCUCAUGGGCUUGCUC
CGGCCAGUCUCUGGAUUGGAACAUGGCCACGGGGUUCUCAAGAGAGCUUGCGAAGU
UCUGUUUGGCGUGGGAGCGUCGAUCUCCGACUGUGACCUAUAGCGACGUAGCGAAA
GUUUGGAGGGAUAUUCUGAGAGGUGCGCUCGGCCUUAUCGCUCAUCGCUGCGAUGC
CAAGGUCAUACGCGGCGACUAUGCUAGUCUGCCGUGUAUAAGGCACAAGACUCGUA
GCUGUGCGAGCCUUGCCGGCACAGACCCUAUGGUCCUGGUUUCGCAUUUAGCAGUG
CUAAUCGAUGUUCUCAUGUGGUUAAUAUCAUCUUUAAUUUCGACAACUCUUACGCC
UAUACGAGUUGCCCGCCCCAAGCCUGACUCGGUCCGGUCGUUCGAUGUAGAAAUCU
GUAACCACGGAAUGCGCGUACUCGAACGUGGCUACAAUAAUCCAUUACCUGGAGUA
ACGUUGUAUAGACACCCCCAACACGUGUUACGUCUAGCCCAAACAUGCACCAUUCAU
AAUCCGGUUGUCAAGGGCAGGCCAGGGGCACCCCAAUUUGUCUUCCAGGUCGAGGC
AUGGUACAUCGUUCUAACUGCUUGGUGGCAUCACCAGUCUUCGUUAGUUGCCGGGC
GAGAAGCUACAGGGAAGGCACCAUUUCAACGGAGUCUAUUGUCCUGUAGCGCCGAG
GGGAUGGCCAGCCGGUCUAACCACCCACGCUGUAAAGUAGCACUCGACCCGAAGAU
GAAAGACCGGAGUAGGCCUGGCCCUUGUUCGCUUCUGCUUGAAUGCUGCAAUACUC
AGUACUUCGAAACGUUCCGUUCCGUUGGCGUUACGUCGCAUGGUAGGCAUAUAGUC
AACGCGGCUAGAGACACUACAGGCGCAUUUGAGGCAGUAACCCUGUUCCUAUUUAG
UAAUUGCUUACUAAAGGCUGAUCGUCUUGCGUUUGAAAUAUCUGGGCCGCCGGAGU
AUGUGCGGUGCUUGGGAUUAGCGCGAAUUGUAUACUUGGAAAAAUCCGGCUCGGUG
CACUUUGUGAAACUAGUUGGUCCUCCCGAAGUGCGCGCCUGUAACAGCCUGCUAUU
CUGUUGCCCUACACUUAAAUACGCAAAUGUGACCCGUACGACAACGCUGUCAUUGC
UAAGUGGAACGGAUAGCGAGAGACUGCGCUGUAUUUGUGAUGCACAGCGUUGCCGG
CAUACAACUAGGUCUCUGCGUCGAGCUGCACUCGGCACUAAUGAUGCAGAUGCGUA
UAGGAGGGGAAACCUUUCAACACUCAGUAAGUCCAAGGAGAACACCAUCGGACGUA
AGUUUACGGGUCCUUCGAACAAAGUACUCAGAACGAUCAGCGACAUUGGUCGAAUU
AGUUCGCGACCUGCAGAAAAAAGUUCCUCGACCGCAAAACACUCAUAUAGAGGACU
UCUAGGGUGCCUACGUUAUCUUGGAUUCUCUUGGUCGGUGACAACUAGGCUAAAAA
GAAAAUUCCUGGCUUACGGAUACCCACCCCAUGGUCAGGACGACAAUACGAGUCGG
GAGGCGGGGGUUACCCUGACGGUAAUUGGGUUGGCGAACAAGUUGCGCGCCAAGAC
UGCAACGGUCAACGGACUUCAGGAUUAUCAUCAACUAUGUCACCACUGUACAAGGU
CGCUUCAUAUAGCGGGUAAAGACUUUAUAGUGGCAGUGUCGGGGACGUUGUCGAUA
AAAAUUUACAACUCAUUUCAUGAGGAGGCGAUGCGUAGUGGGAGGCGGACUUCUAG
GCAAGGUUUUUUCAAGAGGAACGUCCAAACGCAGCCGAAGGCCAACUCGCCUCGCC
AAUAUGUGCCCAUACAGAUACCCUGUCAAUCACGAAUGACAAUCGCGGAAGACAGA
UACCCCCCAGCCCUAGCGCGCGACAUUGUGCGUCUGAGGUCUAGGUCGGCCGUUUGU

GGGUCAGGAUCUGCUCCUAGCCAGACAUCGUGGCGGAUCAUCUUUUGUACAAGGGU
CACACAUGGCACGGAAGGCAUUAUUCGCGGCGCGUUUAUUGCCGCGCGGACCACUA
GGCGUGGCCCCAGAACACCAACAGGAUUAACUCAGGAGAGGCGUCCACCCACCCCGA
CGCUUUUCACACGGGCACAGGUAUACGCUUCUAAGAUGAUACUACGUCUUCUAUAC
AUAACAGUUUCUUUACUGCAGAAUAUGAUUGACCUAGGUCCUGUAAAUCGAGGAUU
GUGCCCUGUCGCCCCCAUUUACACAUCAGGCGUUCUAAACUGUAAGCCGAGUUCGUC
GAUUAAAGUGACUGGUCUAAGCACCUUAUGUCAGCGUGGGACUGACCUUAGUCGGU
UUUAUUGUGCAUGUUAUGAACCGGGUAGAUUUUUAGAGUUACACACUAUUCCACCA
ACCACACGUGGGCGAAAGACGGGACAUUUAGAGGAAGAGGCUAACGACAACGCUCC
GACUGAGAUCAAAAUCCUUCAGUCGAUAGAUCCUCCCCUCGAUCGUUCGAAGCAGG
GCGGGCGACGAUUCGUCAGGGACGGCGGGCCUGUUCGAUCGCCUAAAGAGCCGGAC
AUGGCUUUCAGGCUGAGCGAGGUAAAACUGCCACCUGACUACCCCUCCUACACGAU
UCAAGAGGUCAACUGCAGGGGCUCUAACAUGAUUAAAAAUAUAGGUACCUCACACG
CUCACAAGUACAGCGCAAAUCUAAAGGAAAGUCUGACGCAUCGAAUUACCCAACUC
AAUGGGCAUUACCACAGAAAUCAAGGGUUGUCUCUGAAUGCUGAUUCCUUAUUAGG
AUCUCGGCUUAUUUCAAACGGCUGGUCCCUCAACGCCCGCCCCCCGCGGAAUCGGCU
CGCUUUUCCAAAAUACCUAAGUUCGCCCACUGCCGGCGCAACUUCACUGAUUUCUCA
CCGCGGCCGCUCGUUGCUCGAAAGCGGUCCAGCUUUGCUUCUCGGUUUUAGGUCAG
AACAUCUCCAACCUGGGAAAGCUGUGAUCGUUGGGAUCCACAAGAACUACCCCUCA
UUAAAAUCUGAAGGGAAUCCGCCGUGGACCUCUGAACCUGCGCUGCUUCAUGCUAC
GCCCGGAUUUCAAAUCGAGACUGCCUUAAUUAAGGUAUACGCUACCUUGCCGGGUA
UGAACGACUCCCUCACGCCAGAGUCUUUAAGCCGCUCUCGUCUGCAGGUGGCAGGG
AGGGGCUACUGGGCUUACAUUCUGCGCUGGCAAACGGCGGGGAGAUGGGGCUGUAG
UGAACGGGAUACCCGAUCCCGAACGACAGCCAGGCUACCCCAUUUCCCCGAGUGCGU
CUUAACUCCAUCGCAGAUAGAAUGCCUGUCGCCACUAGAGCACACCGACGGGUUCG
GACGAACAGAUAAGAGUCGCAGGCUGAGACAGGGAGACUCCGGAUUAAUGAAGCUG
CAUAUACCGUCUCCUAUAGUAAAUCAAAACCAAUCAAGCCCAUUUACUUGCGUAGA
GUCCAAAACCAAACUAUUUUUGGGAGCGUGCGCCAGGUGCCACCAAGCUUUACUUG
GAACUUGGUUCGACGAAGACUCCAACCAGGCGGUAUUAAAAUGCUUCAGACUAUAC
CGCUUUAACUAUUACGCGAUCAAGACAGAUUGUUCCAGCAGUCAACAUGCAUCGAG
CGGACAGCCAGCUCUCGCCGCAGAUAUGGCCUAUAAAAGGGCGUGCGUUCAGAGGA
AUAGCUGCCGGUAUGGCGCAUACCCCCCGAGCAACGAUGUGUGGUGCCCAUAUGGC
UACCAGGGGCCUAUACUGGAUGCUUCACGUUACAGGUGGAGAUCCCACGAGGUUUU
ACCUGUAGGGUGCCACCUACCCUUCGAAUGGUCGGAGGUACUCGAUCGACCUCGAU
UAGAGGAGAGUGGCCUUAGUUUGCACAGAGCAAGCAUGACGUCCCUCCGCCCAUCA
UGGAGUUUUGACUGCUACCCUCCAGUCGUAGUAACGCUCAAACCUCAAAAAGCCAC
GAGUUGUGAGUCCCAGCGCAAGAGGAGUAAGACACUUAGCCUGGUUGACCUCGCAC
GAAGUCCAGCGGAAUCCGCGCCUGCGAUCUUUCGCAGUACAGAACCCCGGUAUUCU
UGGAACGUUAAACAUGGGCCCCGCCAAGUACGCUCACGUCUCCUAACGUUGAAGUC
CAAGAUUUCAGCAUUGUGCGAUCCGGUGCUGGACCACAGUAUCAGCCUGUGCCCUU
CAAUCCCUCACGUGAGGACGCUGUUCGGGACCAAGUUGGAGUCGUCUGAGCAAAGA
UGUGCAACGGGACGUGAACCACCACUCGAUCUGACUGAUAAAGUCCUGUCUCGACC
AGGGUAUUACUAUAAAACAAUCGGACCUGAGCGAUUUCGAUUUAAUGGCGCACAAC
GGUAUCCCUGCAGGAUUCUGCGUUCUACCCUACAUCCAACUUCUUUCCCAUGUCUCC
UAUUCCAGCAUAGGGAAAGCUAUUCACUUUGCACGAUUGAGUCGGUAGCAUCCCGA
UACUCACCAGUAGGUGUACCGAAGAACCCCCAGCUCGUCCCCACUGAUGCAACAUUC
UCGUUACCACGCAAAGAAAGUUGUAACUUAUGGCAGAUGCUCGCGGCCGCAUGUCC
CAUUCGAAAGGAGGUGCAAAGUUUCUAUCGUACGGUAUUUUCGGUCCAUCAUAUCG
CAGAGCCCCUAGGCUCAGACGCUCAGCCGUGUGUGUGGGAAUCACAACUGCUUUGU
ACGUGGUCCGGCCUGCCUAUCAUCCAGCGUCUUCCUUCAACGCCUUUCCCCUCCGUC
GAAUAUCCCUCUGCAGUCGGAUGCGACAUCCAGCAGGCUCAGUCGGGGCGACCUGA
CUGUGCACGGCCGCAACGGCCUGCGCGCGUAAAAAGUACGAAAUGGUACUCCCGGU

GUGCCAGUCACAACCCGAGAGUUACGAGUCUAAAUGGGUUUUACGCCUCGCCCACC
AGGGCCCUCCCUCAACGGUCAAUCCCUGUAAAGGCACUCCUAGUCUCAUUGUGGGU
AGAGUAUCCCACCACACGAAGGUACGCGUCUUCUGAGUGCACAAGGGAAUAUGGGC
CAGGAAGCACUCAUAAUAUGCAAAGAUGGAGCAGAGGGCCUGGAUGCGAUAUACAU
CUCGCACUAUCCGCCAACCUUAUUAUUACGGAAAACCUCUCCCCUUUUACUUUAAUA
GAGGUAGUGCCAAAGGACGCACAUUUCAAUCGUACUUUUGAGACGUUUAUCAUGGC
UGGGGCCUUGGGUGAUGCAAGCCUCCGCUACAGAUACGCCCUAGGUAACGCGACCCC
AGUCUUUUUUAUAUUUACUUCAAACGCCCAGAAUUCCGAACGUCCGGCUGUCGUAG
UAGCCAGCUCCCCUUCCACGGAUAAAACCGUGCCCGAUCUUAGCGGAAGAAGCAAU
UUCUCCAACAUUCUCAGCUGCCACCUAAACUCGACUCAUUUCGGAGGGAAGGCAAU
UGGGUUACUUCCAGGAGGACUCACAACUUACGACGUCCACCGUGGGGGGAUAGGCA
GUGCUAAGAUUCCUGAUCAUGGAAUAAUUGAACUCGGUCCAUAUCGUCUGACAAUG
AGGGUGUCCAUCGCCGAACGCGUGAGUGUGCAGAAAUCUACGAGCGGUCGGACCAC
GGCCAAGAACUCCGCACAAUUGUUAGAUAACCUAGUCUUUGAAACCAGAACUCAGC
CUGCUCAGGGGCGGAUACCCCCAUUAGCUCAAGUUAGGAAGUGGUACGCAGCUGUA
CCAACUCGUUACGCGGACCGUAGCUGGGGAUUGUUUCCGGUUGCUAGUACGCUAGC
CCGCCCACAUAACAUCAAAGUUGGGCCUCGACCCUCUAGUCUGAAAGCUGCAACCUU
CCAACAUAUUGCGCCUGCCUUGACCUUAAUCCCGGAUGACAUUGACGCAAAUAAGU
CCCAUCAACACGUUUUAAUGAUACGACGAGCCGGGCUAGAAGUUGUUAGAUUUCGA
UCUAGAAAACUCCGUUUAUUUGGUGAACGCCUUAAGGACUCCCAAUCCCAGGAACC
GGCCCGCGGGAUCGGUCACGGGUUGCCUAAUUCAUCGUAUUCACCCUCUUCACAUCA
GAUCCCCCCACUCAGAUUUGCAAAGUUUUACGGUGAUACAAAUCCCGUCCAGUAUA
GUGGUCCGAAAGGAGACGAUCGUUGCACCUGCUCAUGCGUUACAGAUCGUGGUUCG
GGUUCUACCAAGCGACCAGCCGAUGGACUACGUGCCUAUGUUGUACACCUUGAGGA
GUUGUGGUUCUGGCCAUCACUAGGUAAAUGGAUUAGUGUCGGUAUUUAUGAAGAAU
UCGGUCAAAACAGUCCGCCACCAGGCGGCUUCUAUCUGGUUGCGGGGCCUCAAAAU
CCUGCGCAAUCUGUACUCGUAGUAUACCGUUCGUCCUCAUCAGGGCGCUCUGCGACC
CCAACGAGCACCAUACACUACCGUUCAACCGGGUUCGGCCCCAUAGAUCAACGCCGG
UUCUUUUCAUCGCAGCUAGCUACGAUAAGCACGAUUUCCCUGUCAGGGAAUUCUGG
CCUAUUUAACUGGAGAAAACCUAUCAGACUGCCAUCGUUUCUGACCGUAUUAGUGG
CCACCGGUAACCGUCACCCCACUAGUAUUAAGAACAAUUCCCUGCUUAUAAUAUUU
AUAGUGCGGAACAGCACAAAACAACGAACGGAUAGUCGUUCGAAAUGGGUGAGUCC
ACAACCCCGUGCUUCAGUCCCGCCACACAGCCCUAUAAUGGCGAGGCGCUCAACCGC
AAGGCAAGUCACUUUCCAAAAUGUUUAUACCCACCUUCUGGUCUGUAGUACCAAGC
ACUUAUCAGGAUCCCGUGUGUUUUGCGGGGGGGCAAAAGAUCCUUCCGAGCAGUUA
UUGUCGUCCGUAAGCCUGCCUAGGAAAGUGGUAACAUUGAUCGGUACCACAAACUU
ACGGCUUCAGCGGCGGUGGUAUGCAAAGUGUGCACAACAGAUGUCGCGUCCUCGAA
CAUCGCAAGCACUCGGAAUUACGAUUACGUAUGGUUUCGGUAGUGCAUCCAGUGUU
AUGCAUAGGCGUAGGCGUUCGCUAGGAAAAUGGUACAUAACAUCCGACCUAUGCCC
GAUUACAUCUCUUACAGUCAGGGUAGAGCCCCGUCACAGACGCGGAAGCCCUAGGU
GUGCAGGGCCACCAUACAAAGACACUGACGACCCUGUGACAAUCGGAUUUACGAGA
CGGGGGUGUUUGCGCGUCAUCCAAAACUUAACGCAACCCAUAUAUGCGCGCAUUAC
AAAUUCUAAGAAUGGCUUGCCUGCGGGGGCAGACUUAGCGGUUCUGAAUCCAUUGA
GAUGCCUCAUGCGUAGGUAUAUGGUACGGACAAGGGGCUAUAGAGCUAUCCGCCGU
GGUGACUACAUACACCUCCCCAACUGUACAUGGACUAGGAUUGUAGAUCGUCGUAA
AGGGCGAUGCAAGCCGACACUCCAGACAUGCCCCAGCGACCAUAACUUCCACGGCGU
UGCCAUGUCCGUUAACACUCCUACAAGACGUGAUGACUAUUCCGGGGAUCAAUGGU
UUGCGCCGUCAAUCGCAGUCACGAGUUCCCGCGUAUUUCUUCGUCCAGCAGUACGU
AUGAUAGAAAGUCGCUCGCGGACCGGCUCUGUGCGGACUGCCCAACCUACCACGCCU
UUGAAUAACCAUCACUACUUGCCGCAGAUCCGCUCGUCGAUGGUAGACUACUACGC
GAGGAACCGAAGAGCGUCGAAUGAUGUGUACCCGGCGGACUCCAAGGUCCUAUUCU
CCAACAUAGGUCGAGCUCAAGAAAUUUACUCUAUUCACAUCUCACGCACCGGUUUA

```
AUCAACAGUGAAACAUCUUGGUCUGUCCGAAGUUUACUCUCCUCGGCUCGCCGAAU
CGUGCAAUUUGCGCAUGCUGUACUGAGUGAAGAGUACUUCCCGUGGCGGUCUGGUG
ACAAACAGGAAGCAUGCGGUAAGUUUAACUGGGUACUGUGGAAACCCCUCAAAACC
GCGCGCACCAGGCAAAGUAUCCUACUGGGUUCACCUUUUGGCUGGGAAUUUCGUAA
UGCGGGUCUUAAUUCAUAUGUUCCGAUACAAACGAGCAAUCAGAAGCUCGAUAUUC
AAAUUCUCCCUUUGCUGUGGCAGCUUCGAACACGUCUGGUUAUCAUAUCGCUCGCU
CCUACACCCCGCGGAGGCAAAGGAUUGAAGAUGUAA'
substring=[]

while rna:
   substring.append(rna[:3])
   rna = rna[3:]

for i in substring:
   if i == 'AUG':
      print('M',end='')
   elif i == 'GCC' or i == 'GCG' or i == 'GCU' or i == 'GCA':
      print('A',end='')
   elif i == 'CGU' or i == 'CGC' or i == 'CGA' or i == 'CGG' or i== 'AGA' or i=='AGG':
      print('R',end='')
   elif i == 'CCC' or i == 'CCU' or i == 'CCA' or i == 'CCG':
      print('P',end='')
   elif i == 'ACC' or i == 'ACU' or i == 'ACA' or i == 'ACG':
      print('T',end='')
   elif i == 'GAA' or i == 'GAG':
      print('E',end='')
   elif i == 'GAU' or i == 'GAC':
      print('D',end='')
   elif i == 'AUU' or i == 'AUC' or i == 'AUA':
      print('I',end='')
   elif i=='UUU' or i=='UUC':
      print('F',end='')
   elif i=='UUA' or i=='UUG' or i=='CUU' or i=='CUC' or i=='CUA' or i=='CUG':
      print('L',end='')
   elif i=='UCU' or i=='UCC' or i=='UCA' or i=='UCG'or i=='AGU' or i=='AGC':
      print('S',end='')
   elif i=='UAU' or i=='UAC':
      print('Y',end='')
   elif i=='UGU' or i=='UGC':
      print('C',end='')
   elif i=='CAU' or i=='CAC':
      print('H',end='')
   elif i=='CAA' or i=='CAG':
      print('Q',end='')
   elif i=='AAU' or i=='AAC':
      print('N',end='')
   elif i=='AAA' or i=='AAG':
      print('K',end='')
   elif i=='GUU' or i=='GUC' or i=='GUA' or i=='GUG':
      print('V',end='')
   elif i=='GGU' or i=='GGC' or i=='GGA' or i=='GGG':
      print('G',end='')
```

```
    elif i=='UGG':
        print('W',end='')
```

27.Mendel's First Law

```
x=28

y=20

z=30

ans=((x*x - x) + 2*(x*y) + 2*(x*z) + (.75*(y*y - y)) + 2*(.5*y*z))/((x + y + z)*(x + y + z -1))

print(ans)
```

28.Enumerating k-mers Lexicographically

```
import itertools

n = 3
s = ['A','B', 'C', 'D','E','F','G']
perm = itertools.product(s, repeat=n)
answer = []
for i, j in enumerate(list(perm)):
    permutation = ''
    for item in j:
        permutation += str(item)
    answer.append(permutation)

print(*answer,sep='\n')
```

29.Calculating Expected Offspring

```
a=17976

b=16839

c=16368

d=19262

e=18123

f=16051

g= 2

g1 = g * 0.75

g2 = g * 0.5
```

```
ans = a * g + b * g + c * g + d * g1 + e * g2

print(ans)
```

30.Compute the Number of Peptides of Given Total Mass

```
n=1471
List = [57, 71, 87, 97, 99, 101, 103, 113, 114, 115, 128, 129, 131, 137, 147, 156, 163, 186]
calc = [0]*(n + 1)
j = n
calc[n] = 1
while j > 0:
    for i in List:
        calc[j-i] += calc[j]

    j -= 1
    while calc[j] == 0:
        j -= 1
print (calc[0])
```

31.Enumerating Gene Orders

```
import itertools

n = 6

permutation= list(itertools.permutations([i for i in range(1,n+1)]))

print(len(permutation))

for i in permutation:

    print(str(i)[1:].replace(')','').replace(',',''))
```

32.Finding a Motif in DNA

```
s='AGTTATGGCCGCAACGGCCGCACGGGCCGCAGAAAACCTATTGGGAGGCCGCATAGG
CCGCATGATTGGCCGCAACGGCCGCAGGCCGCATGATCATGGGCCGCAATGGCCGCAGG
CCGCAGACAGTTCTGGCCGCATGGGCCGCATAGTAGTGGCCGCAAATTGGCCGCAGGCC
GCATCAGGGCGGCCGCAAAAGGCCGCAGGCCGCAACGGCCGCAGGCCGCAGGCATAAA
TGGCCGCAGTACGGGGCCGCAGCGGGGCCGCAGGCCGCAGGCCGCAGGCCGCATGGCC
GCACTTGGTCGGCCGCAATCCGGCCGCAGGCCGCAGGCCGCAGGCCGCACTCGGCCGC
ATAGGAAGGCCGCAGGCCGCAGGGCCGCAGTAGGCCGCAGGCCGCAGGATGAGGCCG
CATATGGCCGCACCGCGGCCGCAGGGCCGCATGGCCGCATTGGCCGCAAGCCGGGCCG
CAGGCCGCAACATGGCCGCAACATTGGGGCCGCAGGCCGCAAGGCCGCAAGGCCGCAC
ACAAGGGCCGCAGGCCGCAGGCCGCAGGGGCCGCATGGCCGCAGGCCGCAGCTATGTG
TCCTGTAAGGCCGCAGGCCGCACTTAACAGGGCCGCACTGGGCCGCACGGCCGCAAGG
CCGCATCGGGCCGCATACGATCGGCCGCAAGGTGGCCGCAATGCGGGCCGCAGGCAGG
AGCAGGCCGCAGGCCGCATGGCCGCAGACCGAGAGGCCGCAGTGTCGCAGTAGCTTCG
```

```
GCCGCAAACCAGGCCGCATCGGCCGCATGTCCGGGGCCGCACTGGCCGCATAGAACCG
GGCCGCACCTCAGAGGCCGCATCGGCCGCAGATCCCCCAGGCCGCAATTTTGAAGGCC
GCATGCAGGCCGCAGGCCGCAACCAATCGGCCGCAGGGTAGGCCGCACTCGGAAGAGG
CCGCAGGAGGGCCGCAAAGTTG'

t='GGCCGCAGG'

loc=[]

lengthS= len(s)

lengthT=len(t)

count=0

for i in range (0, lengthS-lengthT+1):

    if s[i:i+lengthT]==t:

        loc.append(i+1)

print(loc)
```

33.Mortal Fibonacci Rabbits

```
n=81
m=16
pair = [0]*m
pair[0]=0
pair[1]=1
for j in range(2,n):
            temp = list(pair)
            pair[0] = sum(pair[1:])
            for i in range(1,m):
                        pair[i] = temp[i-1]
print sum(pair)
```

34.Independent Alleles

```
import math
A = 5
B = 7
pr = 2**A
temp = 0
for i in range(B, pr + 1):
    prob = (math.factorial(pr) /
            (math.factorial(i) * math.factorial(pr - i))) * (0.25**i) * (0.75**(pr - i))
    temp += prob
print(temp)
```

35.Compute the Score of a Linear Peptide

```
mass = {}
mass['G'] = 57
mass['A'] = 71
mass['S'] = 87
mass['P'] = 97
mass['V'] = 99
mass['T'] = 101
mass['C'] = 103
mass['I'] = 113
mass['L'] = 113
mass['N'] = 114
mass['D'] = 115
mass['K'] = 128
mass['Q'] = 128
mass['E'] = 129
mass['M'] = 131
mass['H'] = 137
mass['F'] = 147
mass['R'] = 156
mass['Y'] = 163
mass['W'] = 186

def mass(ss):
	weight = 0
	for i in ss:
		weight += mass[i]
	return weight

def substring(s):
	s2 = [0]
```

```
    for k in range(1,len(s)):
        for i in range(len(s)):
            if i+k <= len(s):
                s2.append(mass(s[i:i+k]))
    s2.append(mass(s))
    s2.sort()
    return s2
```

s = "ACIKYKQLPPLAVQSYDENYHCSAHQVWWIYKNGQ"

range = [0, 57, 71, 71, 71, 87, 87, 97, 97, 99, 99, 101, 103, 103, 113, 113, 113, 113, 114, 115, 115, 128, 128, 128, 128, 128, 128, 129, 129, 137, 156, 163, 163, 163, 170, 171, 174, 184, 185, 186, 186, 186, 194, 200, 201, 210, 210, 215, 215, 216, 216, 227, 234, 240, 241, 241, 241, 244, 250, 256, 257, 257, 258, 266, 278, 281, 283, 285, 285, 287, 287, 298, 299, 299, 300, 307, 307, 314, 315, 319, 328, 329, 337, 338, 344, 349, 365, 369, 370, 372, 378, 378, 380, 385, 385, 385, 386, 386, 386, 386, 400, 403, 403, 407, 411, 415, 420, 427, 435, 442, 448, 450, 452, 456, 466, 471, 473, 474, 477, 477, 485, 491, 493, 494, 498, 498, 498, 499, 501, 508, 513, 514, 514, 544, 548, 548, 549, 553, 559, 563, 563, 563, 566, 572, 572, 584, 585, 589, 590, 592, 595, 595, 601, 605, 613, 619, 622, 626, 626, 627, 628, 637, 650, 652, 661, 663, 672, 676, 685, 685, 687, 688, 690, 692, 692, 700, 700, 712, 718, 718, 721, 722, 723, 726, 729, 735, 739, 747, 752, 758, 758, 776, 778, 789, 792, 793, 799, 800, 800, 803, 805, 805, 813, 813, 813, 814, 820, 836, 838, 842, 846, 846, 851, 853, 855, 863, 871, 871, 873, 876, 877, 900, 905, 908, 913, 913, 921, 922, 928, 933, 933, 933, 939, 941, 948, 950, 952, 966, 966, 968, 970, 970, 974, 975, 975, 999, 999, 1002, 1004, 1009, 1010, 1014, 1015, 1024, 1034, 1036, 1037, 1037, 1040, 1046, 1053, 1061, 1061, 1071, 1078, 1083, 1086, 1096, 1098, 1099, 1103, 1103, 1107, 1108, 1111, 1117, 1129, 1129, 1137, 1138, 1138, 1149, 1152, 1158, 1161, 1162, 1177, 1181, 1186, 1190, 1199, 1200, 1200, 1211, 1212, 1216, 1216, 1220, 1220, 1224, 1224, 1231, 1237, 1248, 1249, 1253, 1255, 1257, 1265, 1274, 1280, 1287, 1291, 1294, 1314, 1315, 1318, 1319, 1321, 1324, 1339, 1340, 1344, 1344, 1351, 1352, 1352, 1353, 1361, 1363, 1368, 1385, 1390, 1402, 1402, 1415, 1416, 1418, 1420, 1423, 1431, 1437, 1443, 1447, 1458, 1464, 1466, 1468, 1468, 1480, 1481, 1489, 1496, 1503, 1514, 1514, 1515, 1518, 1523, 1530, 1531, 1534, 1538, 1548, 1555, 1561, 1565, 1585, 1593, 1594, 1596, 1597, 1602, 1603, 1605, 1609, 1624, 1627, 1629, 1631, 1651, 1652, 1658, 1659, 1660, 1668, 1697, 1698, 1700, 1701, 1709, 1721, 1722, 1724, 1724, 1725, 1730, 1730, 1753, 1766, 1768, 1771, 1787, 1788, 1788, 1795, 1796, 1801, 1808, 1812, 1813, 1821, 1823, 1829, 1837, 1838, 1850, 1881, 1883, 1887, 1892, 1899, 1900, 1910, 1914, 1916, 1916, 1922, 1924, 1934, 1937, 1941, 1951, 1965, 1974, 1979, 1994, 2000, 2005, 2007, 2011, 2012, 2013, 2015, 2027, 2044, 2051, 2052, 2053, 2062, 2086, 2087, 2097, 2102, 2107, 2108, 2108, 2110, 2120, 2128, 2133, 2156, 2157, 2166, 2168, 2181, 2190, 2199, 2201, 2207, 2215, 2215, 2215, 2221, 2223, 2236, 2248, 2260, 2261, 2272, 2284, 2294, 2296, 2302, 2314, 2319, 2320, 2329, 2331, 2343, 2349, 2351, 2376, 2385, 2385, 2386, 2390, 2393, 2397, 2397, 2416, 2430, 2442, 2447, 2448, 2468, 2473, 2477, 2482, 2498, 2500, 2505, 2506, 2513, 2514, 2518, 2529, 2544, 2560, 2571, 2576, 2579, 2595, 2600, 2601, 2601, 2606, 2626, 2631, 2633, 2634, 2643, 2663, 2692, 2692, 2700, 2705, 2713, 2714, 2723, 2729, 2734, 2734, 2734, 2746, 2762, 2771, 2805, 2805, 2810, 2820, 2820, 2827, 2828, 2833, 2847, 2849, 2884, 2891, 2899, 2907, 2920, 2924, 2933, 2933, 2946, 2948, 2950, 2981, 3012, 3019, 3020, 3021, 3021, 3049, 3061, 3061, 3077, 3078, 3109, 3120, 3132, 3134, 3148, 3189, 3190, 3191, 3205, 3206, 3235, 3262, 3276, 3306, 3318, 3318, 3318, 3319, 3319, 3390, 3405, 3421, 3431, 3446, 3447, 3447, 3492, 3519, 3533, 3534, 3559, 3575, 3576, 3605, 3646, 3647, 3662, 3704, 3704, 3733, 3749, 3760, 3817, 3820, 3832, 3863, 3920, 3934, 3945, 3991, 4048, 4119]

```
s2 = substring(s)

val = 0

i = 0

for i in range:

    for j in range(i,len(s2)):

        if i == s2[j]:

            val +=1

            i = j+1

            break

print (val)
```

36.Find the Minimum Number of Coins Needed to Make Change

```
import numpy as coin

n=16856
coins=[1,3,5,17,21]

List = [0]*(n+1)
List[0] = 0
for k in range(1, n+1):
    Min = coin.inf
    for i in coins:
        if k >= i:
            Min = min(Min, List[k-i])
    List[k] = Min + 1
print (List[-1])
```

37.Enumerating Oriented Gene Orderings

```
import itertools
n = 4
Plist = []
total = 0
for i in itertools.permutations(list(range(1, n + 1))):
    for j in itertools.product([-1, 1], repeat=len(list(range(1, n + 1)))):
        temp = [a * sign for a, sign in zip(i, j)]
        Plist.append(temp)
        total += 1
```

```
print(total)
```

38.Inferring mRNA from Protein

```
from Bio import SeqIO
with open('asdf.txt', 'r') as f:
s = f.read().strip()
translation = {
'UUU': 'F', 'CUU': 'L', 'AUU': 'I', 'GUU': 'i',
'UUC': 'F', 'CUC': 'L', 'AUC': 'I', 'GUC': 'i',
'UUA': 'L', 'CUA': 'L', 'AUA': 'I', 'GUA': 'i',
'UUG': 'L', 'CUG': 'L', 'AUG': 'M', 'GUG': 'i',
'UCU': 'S', 'CCU': 'P', 'ACU': 'T', 'GCU': 'A',
'UCC': 'S', 'CCC': 'P', 'ACC': 'T', 'GCC': 'A',
'UCA': 'S', 'CCA': 'P', 'ACA': 'T', 'GCA': 'A',
'UCG': 'S', 'CCG': 'P', 'ACG': 'T', 'GCG': 'A',
'UAU': 'Y', 'CAU': 'H', 'AAU': 'N', 'GAU': 'D',
'UAC': 'Y', 'CAC': 'H', 'AAC': 'N', 'GAC': 'D',
'UAA': 'Stop', 'CAA': 'Q', 'AAA': 'K', 'GAA': 'E',
'UAG': 'Stop', 'CAG': 'Q', 'AAG': 'K', 'GAG': 'E',
'UGU': 'C', 'CGU': 'R', 'AGU': 'S', 'GGU': 'G',
'UGC': 'C', 'CGC': 'R', 'AGC': 'S', 'GGC': 'G',
'UGA': 'Stop', 'CGA': 'R', 'AGA': 'R', 'GGA': 'G',
'UGG': 'W', 'CGG': 'R', 'AGG': 'R', 'GGG': 'G'
}

def translation():
List = {}
for k, i in translation.items():
if i not in List:
List[i] = 0
List[i] += 1
return(List)

def lexicograph(s):
read = translation()
n = read['Stop']
for i in sequence:
n = n*read[i]
return (n % 1000000)
print(lexicograph(s))
```

39.Partial Permutations

```
n = 81

r = 9

temp= 1

for i in range(r):

    temp *= (n - i)

ans=temp % 1000000

print(ans)
```

40.Ordering Strings of Varying Length Lexicographically

```
s = ['J' ,'L', 'D','V', 'C', 'H', 'U', 'O', 'Q', 'F']
n = 3
def dna(s, n):
        if n == 0:
                return [""]
        List = []
        recurrence = dna(s, n-1)
        for i in s:
                for j in recurrence:
                        if not (i == '' and j != ''):
                                List.append(i + j)
        return List

for i in dna(s, n):
        print(i)
```

41.Calculating Protein Mass

```
weights = {'A': 71.03711,'C': 103.00919,  'D': 115.02694,  'E': 129.04259,  'F': 147.06841, 'G':
57.02146, 'H': 137.05891, 'I': 113.08406, 'K': 128.09496, 'L': 113.08406,  'M': 131.04049, 'N':
114.04293,'P': 97.05276,  'Q': 128.05858, 'R': 156.10111,  'S': 87.03203,  'T': 101.04768, 'V':
99.06841, 'W': 186.07931,  'Y': 163.06333}

with open('sampledata.txt', 'r') as f:
    for line in f:
        prot_seq = line.strip('\n')

sum = 0
for i in prot_seq:
    sum += weights[i]
```

```
print('%0.3f' % sum)
```

42.Find All Approximate Occurrences of a Pattern in a String

```
t = "ATTCTGGA"
s='CGCCCGAATCCAGAACGCATTCCCATATTTCGGGACCACTGGCCTCCACGGTACGGAC
GTCAATCAAATGCCTAGCGGCTTGTGGTTTCTCCTACGCTCC'
n=3
p = ""

for i in range(len(s)-len(t)+1):
        q= s[i:i+len(t)]
   temp = 0
   for x, y in zip(a, q):
            if x != y:
                    temp += 1
        x=temp
        if x <= n:
                a += str(i) + " "

print(a)
```

43.Compute the Edit Distance Between Two Strings

```
#include <iostream>
using namespace std;
int main() {
  string amino1="PLEASANTLY";
  string amino2="MEANLY";
  int len1 = amino1.size();
  int len2 =  amino2.size();
  int m[len1 + 1][len2 + 1];
   for (int i = 0; i < len1 + 1; i++)
  {
          m[i][0] = i;
  }
  for (int j = 0; j < len2 + 1; j++)
  {
          m[0][j] = j;
  }
  for (int i = 1; i < len1 + 1; i++)
  {
          for (int j = 1; j < len2 + 1; j++)
          {
                  using std::min;
                  int n;
```

```
                        if (amino1[i - 1] != amino2[j - 1])
                        {
                                n = m[i - 1][j - 1] + 1;
                        }
                        else
                        {
                                n = m[i - 1][j - 1];
                        }
                        m[i][j] = min(n,min(m[i][j - 1] + 1, m[i - 1][j] + 1));
                }
        }


cout << m[len1][len2]<<endl;
  return 0;
}
```

44.Find All Occurrences of a Pattern in a String

t='CGGCATCCG'

s='CGGCATCAACGGCATCGGCGGCATCCGGCATCCGGCATCCGGCATCGCGGCATCGAG
CGGCATCCATACAGGCCGGCATCGCCCCACGGCATCTCAAGCGGCATCACGGACCGGCA
TCATCGGCATCCCGGCATCTTGCCGGCATCCGGCATCGGGATGCGGCATCATCGGCATCC
GGCATCTCGGCATCTCGGCATCGACGGCATCAGGTATCGGCATCAAAAGCCGGCATCCG
GCATCCTGGGCGGCATCTCTCGGCATCTCCGCGGCATCCGGCATCTCGGCATCTTTCGGC
ATCCGGCATCCAACTGCGGCATCCGGCATCGCGGCATCACGGCATCGCCTTACCGGCATC
GTAGACGGCATCCACGGCATCCCGGCATCGTCGGCATCCTCTTCGGCATCCAGACTCGG
CATCGGCCGGCATCTTCTCGGCATCCCTCAGTACGCACGGCATCAATACGGCATCCGGCA
TCCGGCATCGATGGACGGCATCGTACGGCATCTATCGGCATCCGGCATCAACTAGCCGGC
ATCTTATGCTCAAGCGGCATCACGTTACGCGGCATCACCGGCATCCGGCATCCGGCATCC
ACGGGTCCGGCATCTTCGGCATCTCGGCATCCGGCATCCGACGGCATCTCGGCATCCGG
CATCTGCGGCATCGCGAACGGCATCATCGCGACTCGGCATCGCGCGGTTCGCGGCATCA
TGCGGCATCCGCATTCGGCATCCGGCATCCTCTCCCCACCGGCATCGGCGGCATCGCGGC
ATCCGGCATCCGGCATCGACGGCATCGCCGGCATCCGGCATCATACGGCATCACCCACTA
ACTCGGCATCGCCGGCGGTTGCCTTTAACGGCATCACGGCATCAATCGGCATCCGGCATC
CGACTAAGCGGCGGCATCATTCTCGGCATCTAATCCGGCATCTACGGCATCGCGGCATCC
GGCATCCGGCATCGGCGGCATCCCCCGGCATCCGGCATCGCGGCATCACTCGGCATCCTC
GGCATCTGCACGGCATCGTCCACCAGCGGCATCCTCAACGGCATCATACGGCATCCCCG
GCATCCCGGCATCGGAACATTGCGGCATCGCGGCATCTACGGCATCCCGGCATCCAGATC
TTCGGCATCCACGGCATCGTCGGCATCACGGCATCGATTCGGTCCAACGGCATCGACGTT
GCCGGCATCAGAGATCTACAACGTCGGCATCCGGCATCCGGCATCATCGGCATCTCGGCA
TCAGCGGCATCCGGCATCCGGCATCGTTAGCGGCATCTCGGCATCTCACAACGGCATCAC
GGCATCTCGGCATCCGGCATCAACGGCATCGCGGCATCCGGCATCTACGGCATCTGCGCG
GCATCTCTCGGCATCATACGGCATCTGCGGCATCACGTTGTCGGCATCCGGCATCCTATC

GGCATCTTCGGCATCCGGCATCAGCGGCATCAACGGCATCTCGACGGCATCGGCGGCAT
CCGGCATCCGGCATCGCGGCATCCGGCATCCGGCATCTCTGACGGCATCTTGACGCGGC
ATCCTTCTGACCGGCATCACGGCATCGCGGCATCTGCGGCATCTGATTGCGGCATCCACC
TGGACGGCATCCGGCATCTGACGGCATCCTGCCGGCATCGGCGGCATCCGGCATCTTATT
GGCCCGCTGTTTAACGGCATCCGGCATCCCGGCATCTCGAAGCCGGCATCCCGGCATCTT
TCTCGGCATCCAACGGCATCAACGGCATCTCCGGCATCCGGCATCATCCCCATCTGCGGC
ATCTCCCATCGGCATCACGGCATCCACGGCATCAGCGCGGCATCGAACGGCATCCTTAGA
ACGGCATCACCAGCGGCATCGGCGGCATCCTGCCGGCATCGCCCACGGCATCCGGCATC
ACGACCCGGCATCCGGCATCGACGGCATCGCGGCATCTTCGTGGCCACGGCATCTCGGC
ATCCCGGCATCAATGCCGGCATCCGGCATCTGGCTCGGCATCTCGGCATCCGGCATCCCA
CCGGCATCCGGCATCTCGGCATCTGATCGGCATCAGGGTCGGCATCCGGCATCCTTCGGC
ATCCGCGGCATCCGGCATCCCCGGCATCACGGCATCTGCGGCATCTCGGCATCAACATAT
TTTCGGCATCTGCGGCGGCATCCGGCATCCGGCATCACGGCATCGTGGCGGCATCTATCG
GCATCTGACCGGCATCCGGCATCGGCGGCATCCTGAACGGCATCAATCCGCGGCATCGG
TATGGCCGGCATCACAGCGGCATCAGAAACTTACAGTATCGGCATCAGCGGCATCCTACC
GGAACGGCATCACCATGCGGCCGGCATCGCCGGCATCCGCAGCCGGCATCCCAACGGCA
TCCAGGCGGCATCCACGGCATCATACTACGAAGAGCGGCATCCGGCATCCGGCATCTATT
GCGGCATCGTCATACGACACGGCATCACGGCATCCGGCATCGCGGCATCCGGCATCCGC
GGCATCGTTCCCCCGGCATCCGCGGACGGCATCGCGGCATCTTGGAGTTCGGCATCCAC
GGCATCTGGCGGCATCGTAGCCGGCATCCAACGGCATCGACCTATCGGCATCCTCGCGG
CATCATTCCTCGGCATCAATGTCGGCATCCGGCATCTGCCGGCATCTCCGAACGGCATCC
CGGCATCGGCGGCATCGCGGCATCCGGCATCTCGGCATCCCGGCATCGAGCCGCGGCAT
CCCGGCATCTATAAACGGCATCCTTCGGCATCATCGGCATCGAGCCGGCATCCCGGCATC
CGGCATCCGGCATCCCGGCATCCGGCATCCGGCATCCGCACATCGGCATCGCGTCGGCAT
CTCCGGCATCGCGGCATCTCGGCATCACGGCATCTCGGCATCGCACCGGCATCCGGCATC
CGGCATCGACGGCATCGTAAGACCGGCATCCTCTAACGGCATCCCCGGCATCTTCGGCAT
CGCGGCATCACAAAATTCAACGGCATCCGGCATCCGGCATCAAGCGGCATCCTGCCGGC
ATCTCGGCATCGCGGCATCTTTCGGCATCGTTGTCGGCATCCCGGCATCCCGGCATCCGG
CATCCGGCATCCGGCATCCGGCATCAAATAACCGGCATCCGGCATCCGGCATCGCGGCAT
CGTCGGCATCCGGAATCGGCATCACTTGAGCGGCATCGCGGCATCACCGGCATCAACAG
CCGGCATCATCGGCATCTTCCGCCAACCGGCATCCTCGGCATCAGAGCGGCATCGCGGC
ATCCTGTAATTCGGCATCCGGCATCGTACGGCATCACCCTCGGCATCGGCACACCCGGCA
TCATAAAGATTCGGCATCAACGGCATCCGGCATCCGGCATCTCTCGGCATCTCGGCATCA
CGGCATCATCCGGCGGCATCGGCCGGCATCGGCGGCATCCCGGCATCCGGCATCCGGCA
TCCCTTCGGCATCAACACCGGCATCTCGGCATCGTCGGCATCTTCGGCATCCGGCATCTT
CCACGGCATCACGGCATCACGCGGCATCTTTTACGCGGCATCCCCACATCGGCATCCCCG
GCATCCGGCATCCGGCATCCCGGCATCCGGCATCTACGGCATCCGGCATCTCGAGACGGC
ATCCAAGCGGCATCTTGCTCGGCATCGCGGCATCTACGGCATCCACCCCACGGCATCTCG
GCATCCCGGCATCCGGCATCCGGCATCGTGGACGGCATCTGGCGGCATCCGGCATCATAA
ACGGCATCGCGGCATCTCACGGCATCGTCGGCATCGAAGCGGCATCAGCGGCATCTAGG
GAGTCGGCATCCCGGCATCCGGCATCAAAGAGGTTACTCGGCATCCGGCATCCCCGGCA
TCTCGGCATCTCGGCATCATTACTCGCCGGCATCTCGGCATCGTTCCTGACGGCATCACG
GCATCTCGGCATCCGGCATCCGGCATCATCCGGCATCTCGGCATCGTGCGGCATCGTACG
GCATCCTCGCCCGGCATCACGGCATCCGCGGCATCATCCGGCATCAGGACGCCGGCATC
GAGACGGCATCCGAATCGAGCTCGGCATCCCGGCATCCGGCATCACGGCATCCCCGGCA
TCCGGCATCAGCGGCATCGCGGCATCCGGCATCCTCGGCATCATCGGCATCACGGCATCG

CGGCATCCGGCATCTATCACCTGACACGGTCGGCATCTACCGGCATCTTCGGCATCCGGC
ATCCTCGGCATCAATGGTACCGGCATCTAGGCCGGCATCTCTGCACGCTGTCGGCATCTC
GGCATCGCGACGGCATCTGTGCGGCATCCGGCATCGACCCGGCATCGTCCGGCATCTCG
TCGGCATCCGGCATCTGGTCCCGGCATCCGGCATCCGGCATCGCGGCATCGACCGGCATC
GCCGGCATCTTCGGCATCCGGCATCCGGCATCGACGGCATCACGGCATCCGTCGGCATCC
CGGCATCCACACGGCATCCGGCATCACTTACGCCGGCATCGTCGAGTTCCCGGCATCTCT
CTGAACGGCATCTCGGCATCCGGCATCTTTACGCGGCATCTGCGGCATCACCGCGGCATC
CGGCATCCGGCATCGCGGCATCCGCGGCATCTCGGCATCGCGGCATCTCGTCCGGCATCT
CCGGCATCCGGCATCTAGAACGGCATCCGGCATCACGGCATCCGGCATCTCGACGGCAT
CCTCAGCGGCATCGCGGCATCCGGCATCCGGCATCCGGCATCCGGCATCCGGCATCCCG
GCATCGCGGCATCGCGCCCGGCATCCGGCATCCGGCATCGGATACGTACGGCATCAGCG
GCATCATTAACGGCATCTCGGCATCCCGGCATCTCGGCATCTGCAAAGCGGCATCGATCT
TGCGGCATCCGCACGGCATCCTATTAAATTGCGGTGTTTCGGCATCGCATTGCGGCATCA
TCCGGCATCCTGCGGCATCTTCGGCATCCGGCATCCGGCATCTCGGCATCCGGCATCACA
CTCGGCATCAAGTGCGGCATCCGGCATCCGGCATCCGGCATCATTGCCGGCATCCGGCAT
CTCGGCATCCGGCATCGATCGGCATCCGGCATCCCGTGCGGGCGGCATCACTGCGGCAT
CAGCTTCCATCTGCGGCATCATACGGCATCTATTCGGCATCCGGCATCTGGGCTCGGCAT
CCGGCATCCGGCATCCGGCATCCACGGCATCTTCTCGGCATCCGGGCGGCATCACTGAG
CCAAATCGGCATCTACATAGCCAGCGGCATCCCGGCATCCGGCATCCCGGCATCCGGCAT
CTGGCCGGCATCCCCCTTCGTCGGCATCCGGCATCCGGCATCTCGGCATCCGGCATCGCG
GCATCGTCACGGCATCTGACGGCATCCGGCATCCGGCATCCGGCATCCCGGCATCCCCGC
GGCATCGGCGGCATCCGGCATCTATCGGCATCGACGGCATCTACGAGCCTGAGGCTATGA
GACGGCATCAGGCGGCATCCGGCATCGTACGGCATCGACGGCATCTGAAGCTTCGGCAT
CCGGCATCTCCGACGGCATCGGACGGCATCCGGCATCCGGCATCCGGCATCCGCGGCAT
CCCCGGCATCGCTCGGCATCCAACGTCGGCATCCGGCATCCGGCATCCGTCAACCTACG
CGGCATCCGGCATCCGGCATCTATCGGCATCCGGCATCACGGCATCCAACGGCATCCGGC
ATCCCGGCATCTCGGCATCCGGCATCATACGGCATCGTCGGCATCGCCCGGCATCTGCGG
CATCTCCGGCATCACAGGACGGCATCCCACGAGGCGGCATCCCCCCGGCATCCGGCATC
CCGGCATCACCGGCCCCGGCATCCGGCATCCAGCGGCATCCACGGCATCCGGCATCCGG
CATCTTGTTAGTCGGCATCACCGGCATCCGGCATCCGGCATCCGGCATCCGGCATCTCGG
CATCAACACAAGCCGCGGCATCTCACTTAGCGGCATCCGGGGGGGCGGCATCACGGCAT
CCGGCATCTGCCGGCATCGTGCTATACGGCATCCTCCGGCATCCGCGGCATCAGCGGCAT
CTACGAACCGGCATCAAGCGGCATCACGGCATCGATGATCCGGCATCGAGACGGCATCT
CGGCATCCGGCATCGACGGCATCACCGGCATCCGGCATCCGGCATCCGGCATCGCGGCA
TCCGGCATCCTGCCGGCATCCGGCATCAGCATCAGCTCCGGCATCGGCGGCATCTAGCCG
GCATCCGGCATCACGCGGCATCTCGTTAGTAGACGGCATCCGGCATCTGTACCGGCATCC
GGCATCCCGGCATCGATCGGCATCACGGCATCGTTCGGCATCCCCGGCATCCCAGCGGCA
TCTTCGGCATCGCCGGCATCCGATAAGCCGGCATCTTGACGGCATCCGGCATCCCACACG
GCATCCACGGCATCCGGCATCTACGGCATCCGGCATCTATACCTCGCCCGGCATCAGCAC
ATACACGGCATCAACGGCATCCGGCATCGTATATCCGGCATCATTGAGGATAGCCGGCAT
CTAGATTCTTTCGGCATCAGCCGGCATCGTTACGGCATCCGGCATCCCGGCATCAAACCG
GCATCCGCGGCATCTCGGCATCGCGGCATCGTTGCGGCATCCTCGGCATCGTCGGCATCA
CGGCATCTGCCGGCATCACACGGCATCCCACATCGGCATCGTCAAACTCGGCATCGAGG
TCCCCTCTCGGCATCACGGCATCGCGGCATCCGCGGCATCCCGGCATCCGGCATCTCGGC
ATCTAGCGGCATCCACGGCATCACAAGGCGGCATCTGAACGGCATCCGGCATCATTCGC
GGCATCACGGCATCATACTCGGCATCGCGGCATCGCGGCATCAATCGGCATCCGGCATCG

```
CGGCATCCAACGGCATCCATCCGGCATCCGGCATCATGAAAGCGGCATCCGGCATCGGG
CCGGCATCGTTATCCGGTAATCGGCATCGGCGGCATCATACCGGCATCGTGTCGGCATCC
GGCATCCGGCATCGCGGCATCCCGGCATCTCGGCATCTGACGGCTCATACGGCATCGCGG
CATCCCCGGCATCCGGCATCCGACGGCATCCGGCATCCGGCATCCATTTTATAACGGCAT
CCCGGCATCCCGGCATCCCGGCATCCTCGGCATCCGGCATCTCGGCATCGCGCATTACGC
GGCATCCCGCGGCATCCTTGCCGGCATCTCCGGCATCACGGCATCTCGGCATCGCATCGG
CATCCTGGCGGCATCGCGGCATCTACACGGCATCCAACGGCATCCGGCATCACGGCATCT
TCCCGGCATCAAGGTGGCGGCATCCGGCATCTCCGGCATCTATGGGCGGCATCCGGCATC
CTGAGCCGGCATCCGCCGTCTGATCCGGCATCACGGCATCTTACGGCATCTTCGAGTGAC
CGGCATCCGCGACTTCGGCATCGAGGGGCGGCATCCGGCATCTCGGCATCTCTAGCGGC
ATCCGGCATCCGGCATCAACGGCATCACGGCATCCGGCATCGCCGGCATCTGTCCCGGCA
TCACGGCATCATGGGCGGCATCCACGGCATCCGGCATCCGGCATCGACGGCATCCGGCA
TCCGGCATCCGCAGAACGGCATCTCTTCGGCATCCGGCATCGCTCGGCATCAGACGGCG
GCATCTCGGCATCGCGGCATCTCGGCATCTCGGCATCACGGCATCGTTCACGGCATCCCG
GCATCACGGCATCACGCCGACTTTCGGCATCCCCGGCATCCAAATCTCCCGGCATCGGG
CGGCATCACTTACCGGCATCCGGCATCAAGACGGCATCCGGCATCGACGGCATCCCCGG
CATCGTCGGCATCCGGCATCCGCGGCATCACGGCATCTGCATTCGGCATCCGGCATCAGT
CCGGCATCGCGGCATCCGGCATCAAAGGCGGCATCCGGCATCGCGGCATCCGGCATCCG
GCATCTCCGCGGCATCCGCGGCATCCAGTTGTACATATTAGTCGGCATCCGGCATCCCATC
GGCATCAACGGCATCCCGGCATCCGGCATCCCGGCATCTGTAGAGGCCGGCATCCGGCA
TCCCGGCATCAGTCGGCATCAACAGCGAACGGCATCAACGGCATC'

loc=[]
lengthS= len(s)
lengthT=len(t)
count=0
for i in range (0, lengthS-lengthT+1):
    if s[i:i+lengthT]==t:
        loc.append(i)
print(loc)
```

45.Generate the Theoretical Spectrum of a Linear Peptide

```
mass = {}
mass['G'] = 57
```

```
mass['A'] = 71
mass['S'] = 87
mass['P'] = 97
mass['V'] = 99
mass['T'] = 101
mass['C'] = 103
mass['I'] = 113
mass['L'] = 113
mass['N'] = 114
mass['D'] = 115
mass['K'] = 128
mass['Q'] = 128
mass['E'] = 129
mass['M'] = 131
mass['H'] = 137
mass['F'] = 147
mass['R'] = 156
mass['Y'] = 163
mass['W'] = 186

def mass(s):
        weight = 0
        for i in s:
                weight += mass[i]
        return weight


s='VRGVPCTPEASTIEDEETMTNQQVHAVQAMCVKVVQFACFWFHEPLT'
temp = [0]
for j in range(1,len(s)):
   for i in range(len(s)):
           if i+j <= len(s) :
```

```
            temp.append(mass(s[i:i+j]))


temp.append(mass(s))

temp.sort()



List = ""

for i in temp:

    List +=  str(i) + " "

print(p)
```

46.Find the Most Frequent Words in a String

```
s = 'ACGTTGCATGTCGCATGATGCATGAGAGCT'
n=4
List = []

for i in range(len(s)-n):
    List.append(s[i:i+n])
List = [val for val in set(List)]
Listt = ''
temp = 0
for word in List:
    count = 0
    for i in range(len(s)-n):
        if s[i:i+n] == word:
            count += 1
    if count >= temp:
        temp = count
print (word)
```

47.Fibonacci Numbers

```
n=20

def fib(n):

    if n==0:

        return 0

    elif n==1:

        return 1

    else:
```

```
    return fib(n-1)+fib(n-2)
print(fib(n))
```

48.Find the Reverse Complement of a String

```
s='TAACTTTGCCTTGAGGTTCCGGATTTTCACGGATATGGCCATATAAACAGTCGCTACCC
CATTGCTGGCTACGTCAGGTCGTAAGAGCTATTTGACAGATATAACTGTACACTATCCTTG
AGTAAAGGACTAAGGTCTCTACCGAGTGGGCACACGCGCAGAGGACAGTAACCCGCAC
TGGCGACTCCATGCGCAAGCACAGAACGGTGCAATCATATCGATGTCAACGCGGTCATA
CAGGCATATCGCACCTAACTTTTGGCCCTTTCGTTATAGCCCTATCCGATAATCGTGGGCT
CTTTGGTTGCTAGGTGCGTGGATTGTCGGACTCTACCGCCCAGATGCTAAAACGCTTAGT
TCCACGCCTTAGACTTACCTGCAATTACCTTCGGAAGAGGATCATCCCCAACTTGTGGAG
CTTCAATTGTCACAGAGATACAAGAAGGGGGGGCATCTGATTCCGCTCGAAAGAGTACT
GCATATGTGAATCGCCAATCGCGTCGAATTCAACGACGGGACCATGCACCCTGTCATGA
GGCTGAGACAGGTGATTCTGGTTAAGTACCCGGCGCGCGAGGTACCGTTAATAGCCTTT
GGTAAACCCCAGATGATAGATCCGTTAGCCAATCTCGATGTCCGTCGGTGCCCCGACAGC
CTACTGATGAGAGGCCGGCCGAACCCCGACCGCTGCCTCTGTTTGACAGAATCATACAT
CCATATTGGTATTACCGAAGTAACACGTCGTCCCTAGTATCCCCTAGTTTTCCGGTACCTC
AGCCTTCCGAATGCAGAGCGCTGTCTAGCCTGAGCAAATAGCTATAAATGCTTCCGGTCG
ACGGGAGGAGGTCTGTGCAGCCAACTATGCCCCTGAGCTGGTAACACCTGTTTAAAAAT
TAAAGGTGTGGTCGACTCTATCTCAAGAAGCTTGCTAAGGCACTACTATTGGGCGCGCC
CTAGCGTATCGTGGTCCGGCGGGCTATTCGTATTTGGTAGTCGGAACGGTAGCGCAGCAA
CACGCGATCGCTTACCCAAAACGCATAGCTGCGAAATTTAAACGTGGTTAGTACGTGGC
CCCCGTGCGTAATTTACTACTTCAAAGCTCTATTGGAAATGCCGAGAGTGTGTACCATTT
GCTCTTTTCTACCACACGTTCTAGGGATTAAAAAACTGCCGCTATCAGGGGCTCCCAGAA
TCACTCATTTCGATACCGCGTGCTCTACCCTGACGGGTAAGGCATCCTTGTGGCAATAGT
AGATTCCGATTCGTTGTGTCGTCCTTGGTTTCCCTCGATGTCGACGGGCTAGAGTTACGA
GTCGAACCACACTTTCCACAGGTGGTGCCGGTTAGGTAGCCTTTGCTGTCTACGCTGATT
AGAAGCACCGAAAGAAGAAGCTGTCCTCTACGGAGAAAATCCGGAAAGAGGGATAAA
GCTAGTTAGATTACAGCATGCCATATGTGAAGCAGTGCATGGTCATACTAAGGACTTCAC
TTCCTTACGATTCCCACATTGTCCGATCGAATTGTTGTGCAATGCATCCTCATGTACAAGC
GGAACAGGTTCAAACGAGAACAATATGATCTAGATCGGTGATACTCGCAGTACTACAGG
GGCCTCAACGGCGTCGACTCGATTAGGCGTGCGATAAAAGCTCGGGCCGGGCTCGGTC
GTCCGGCTGATTTATTAATCAGACTGGGGGGCGGGAACACAGGCCATTCGTGCATATTCA
CCAATGACTTCGAATGCCTCGACCGTATAGCAGATCCACGAGATAGCCGTCACAAGTGT
GTTTCGCATTTCATGGCGCACGGGTCCTGTCATTCTTGATTTACCCACACTGATGTTTTAC
ATTAGGCCTCAACTATAGGACCACCAGTCCTGAAATACGATCCCCTGTTGGGATTGTAGC
AGTTGCGTGTATTCCCCCCAAACAGGGCTCTCTTAGCGGACCGGGGGGTACAAGATCCA
CCGTCGTTGCTCTAAGGACTCAGTCGACGAAGAGTAGAAATCTCCTGTCTTAATCAGTC
GGCATGGCTTCAAGAGGGTCCTTCCGGAGTGTACTTTGGTAACAAAAGTACGGCGGATC
CTCATTATGTCCTCGCTTAAGGCCGCCCCTAAGGCTTAGAATAAAGCAGGTCCAGTCCGG
GCCGATGTAACTTAGACTATGAAGGTTGCTCGTTCTCAGACATCGGGAAGTAACGCACG
GAAATGCAACGCACTACCATGTCATACCTTCCCTAGAAAGGAGTAGGTACTCGAGTAAG
GTCATTTCGGCCTATCCCTACACAAATTCGATCGCTGGACTCCCCCGGTGTGGCAGGCTT
CTTCAAAATCGGGCGGTGTTCGATGCGGTGATCTGTGTGCAAGCCCCAATGGCTCCTGA
TGTAATGAGGGCTTTTCTACAGACGTCACTTATCTGCCCAGCACAGCGCATCATTGGCTC
TAGTCTGGGCCAGAGAGCTCTCAAGTAAGTAGCTCGACCGGGGACCTAGTTGGCGTAAA
GATCAGCAAGTGCTCAGCAAAGGCAGGTAGCGTCGGATATCTCGAGAATGTTTATACTC
ACACCAGCAAGTGAAGGCCTTGGATCTGATACCTCAAAGTCCAGTGATGCATACGAATG
TCGTGCAAGTGTAGCGGTCCAGGTTTATCTTCCCCCTGTGCGCCCCCTATACAATATAGAT
TTCATAGTCCCAGTAGGACACAACAACGTTAATTCTATACCGACTATCACCCAGTCCTCA
AACTTCGTTTAACGTTGTGATGCACTTAGGTATTGGCACTGCTGGGTACTTCGGAAGGTG
```

AGGGGCAGATGAAATACATACTTGGTCGGTGCTTGTGAACCCTATCCCGATTTTGTAACA
CCCTCAGTATAACGGAGCTTTTTTGTGGCAGCTACCTATTGGTCAGAAAGTCCCAACATA
AGTGTCTCTTTGCTTTTACCTGGAAATGCGCTAGTCCCCAACTGACAAGCGGGTGTACCC
TAATATTTCATAATCACCCCGTCGAAATCTTATCCAAATAAGACATCATGGCACGTGTTAT
CCTACCTAGGACTTGCTGGCTGTCTTATCGCGGCCAACAGTAAAGGCTTTATTAGTCCCG
GGCTACTGTTTGACGCCTTGTAGGCAACCTGTCATGAACGAGTTCTGCAATCACCTGAC
TGCACAAGTATTATAGCGAGGGTAAATTGAAACTTAGCTTATATGACATTCTGCTTATGCT
AGACTCTTCGTCAAGCTAGACAGCCATTGAATCCGACGAAACCGCCTAGCATATTAAAGT
AAAGTTCGGGAGCAGGCCGTAGTCATCGAGTACGTATCTCATAAGTGGGATAGTAGTCT
GGGGACACCACCCAAAGTGGATGCGGGCCGAGGGAGTCTAACTGCTGCTCTTAGCTAG
AGGGTTCGCCACTCTCACACCCACGGGAAGTTAGGGGATTCTGATAGTTATTGATCAGTT
CGACGTTTGCTTAATCGTTTCTCCCCGAGGATACACAGGTGCCGTACAGGCTATCGAGCA
TTAGGAGGTCGGGCTTTGAGTTTTTTGCGATTAATGGGTGTCGTCCCACGCTCTGGTACC
CCATGACTGTGGCCCAACGCCTTCAAGTAAGAATAACCAGTAAATGGTCTTAGAAATAG
GGTATATAATCCTACCGTCAATTCCGGTTCCACATACAACCTTGAATGGTTACATCTGAGT
AGGCTGAGCAGACAGAGCACCCAAGTTGGTTGGGCGGTATGCCAAGAGTCCAGTCATT
ACACGCGAGTTGTGACCTGTTTCAAAATGTTCCCACCCGCGTGGGGGATGTGAGACGG
GAAATTGGGACAAATAGGTTGGTGGGGATGTGAGTTTTGAGACGATAGAAATATCGATC
GGGCGAAATATTGTCACTAACTGGATGGCAGATCCGAATGGTCGCATAATGCTTAAGTCG
AAACATCTGAAGGCTCCCTAATCACTCGGAATAGGGAATGTACATCGCTCCCTCCATTCA
ACGGCCCTACTGCCTCAAGACCCCCTTAGATCCACTCGTATCAGTTCGCGAACAAGTCA
AAGACACTTGAACGTGACGCAAAGGCGAGAGGAGTTTTCAACCAGGCGGTCTTTGTGG
CGTTCACCTATGGTCGTGTACTCTGGTTGTGTATTCGGGTTTGTAATGTGCACGAGGCTAT
TTTGTGTACACTCCGTTTTAGAATGGGCCCCGTCATTTACCCTAAGTCCGTACGCGTAGAT
TTGATATAAGCATTAGAGTCCGGGACTTGTCAAAGTCTATATAACGCGCCGCTAAGCAGA
TCCATAGCGGCCATGCTCAAAGACTCGGCTATGATCATTATTAGTTGCCTACCCGGTTCTC
TTCAAAGGTGGACAGTGTGAGACTGAGCACGCCAACCGCCGTGTTGTCACGCCACCGC
ACACAGGAGTCTGTTTTCTCGACTGTCGAAGGCGTCATACAAACGGTACTTATAATTCTT
AATTGGGTGAGACCTTCCGCACTGACTCCTTCGTCAATGCTGGCGTTCTGGTTCATCGAG
TGGTCCATCCTGTGGTAGCACGTGATCTCAAGTGACCTTGACGCCTGCTCCAGGTTATAC
TTTTATGCGGGTATATTAGACCTCACTCGGCGAAAATTTCACCTCAACTCGTTCCGGCGA
GATGTAAATTGGTGCCCGTAGATGCAGTGCTCTTATCTTGAACCACGGAGGCCCAAGCT
GTACAACATTTTATGAATTCGGCGTCACTCCATTGCTCTAGTCGAGGCTGATATCTCCCGG
TATTGTTCACATAGAAATTGGAGTCTCATCTCGGCCCGAGATAGCCGATTTCAGAATCCG
ATTCTGGCGCAAAAAAGTGAGCAGGCCCTATGAGGGCGCTGTAACATCAGAGCTGCTCT
ACTCCTAGATGAGGTTAGACTTAGATTTGGTCTAGCTAATAGAGCTAGACCTTGTAGCAG
AAAATCACTCGTCTACACCTTGAGAACCATGGCCTTCAGCATGTCTCAATGCATACAAGT
TTTACCTGGTATTAAGATAGGCGATGACCCGGAATCCCAAACCCGTAGCGGTAGAGGCTC
GCAAACTGGCAAGAAACGGGATGTACAAGATTTGAAATTAGATCTTGCTAATCATCTATC
GGATGGTCGCACATTCGTAGCAAATATGCCTAGAGCCCATAGCTACAACCTACCTTCGAA
TGAGCCGCGCATGCAAAATACGCATCGGCTGCGTGAGCTTGACGATATATACTGTGCCCC
TTTCGAATTCCAGTGGTAGGTATAGCCGGGCCGAGAAGTCACTTAACAATCTCTCGTTCA
TGTTGATTCGCTCTTAGTTGTGTAAGTGAAAATACACTACTCAACCTTCCCCCGCATAGT
CGAGGTAGAGTAGTGACCATCTACCACCTAGTGAGCAGAACGTGCCTTACCAGTTTGCG
CAAATAGCGTCGATGATAACGCTTTGCCTGAACGGGCTTAGAAGAGGTTGCTGAAAGGT
CAGGGATATGCAAGAGTGTACAGCGCCGCAGGCGCAAAGTCGAAATTCCCAATCTCTAG
GTTCTGGTATCCTCGACTTACGCCATTGTATAGCTAAACCCCCGATGCCAACGAAATGGG
TCTCTCTCCAGTTAACGTAGCAATCTACCTTGGACGGGCCATTGCTTAGGTCCCTGCATA
GATTGAAGTACAGCGTAATCCTCTCGGACACAAAATATATCTTAGAGAGCATCGGTGAGT
CACCCCCGGTCCTTAGAGGGGTATAGAGAATGCTTCGGCTTCTAGAAAGTCTCAACTGC
CAATGCTGAATCAGGGGTGGACGATAAAAGCGATTAATCTGTTTATACGGGAAGGCAAC
TTTGCCTCTTTCTCCACCCTCCAGCTCTCCTTGTGAGTATCACATTGAGATATAGGGTCAG

ACGTCAGCTCCTTGGGTACACCCGTGTACTTTGTGTTGTTTGCACTACAACTAATGGCAA
TAAGTGCTGGTGATTATTTTCGGATTTAGCATGCGCGGACGAAATCCGGAATACACCATC
CCCTTCAAGTCTACGGCTACGAATGTTATGTCCACCTTAGGGGAGCAGTACGTAACCGAC
AAACTGCGTGCAAAAATCAGAATTGACATTAGCGTTCCCTTGCACACGATACCTTCTGCT
ACCGCGGCGGGCGTATTTTTGAAGCTCTAAAGTTCCAGAGTCACCTGGCTCATACTAGC
AGAATCAAGGCGAAGTCTTCACCGGAGATTCTGCCAAGCAGACTCCACGTCTATGAAGT
GAGCTGACCGAAGCGGACTTGTAATCGGTGATGCCTTCTCTAACTTGTCTTTAGGGTGCA
TCTAACCTGGCTCTGCTCCCTCGCTGACAGAGCGGAATTGTCGGAGATCGAGGCTGTGG
GGTCCGTTCGGGCAGGTAGTACGGTTGGATGCATTCCAGCGACGTACAAACCTGCCGGG
CCCCTAAGGATAACTCTAATTGACTATTTACACCGTCTTAAGTTTCAGCAGTTCTGACATG
TAGAAGGTGGAAACACGAATTGTATACGTTCTAGTTTCCGGGGCGCAAAGAACATTGAT
TGAAGCTACCGTAATGAGGGCGATAGTGAGTTCGAAGCCGAACCGATCGAACAAAGGG
CTAGGGGTCAGCAAATATTCGACCAATTCTGAAGAGAGGCCGGATCTTAAATGACTAGA
GGCCGGTGTTTTGCAATTATGAGAAGTGAAGAAGACCGAGTCACTAGGAATCCAGGCTG
CACCTGTCGGCTGCGTGACGAGGGAAATTGTACACTGTCACGGGTGGCCTACGGACGA
GTCTTACGCCACGTTACAGTGCCCTCGTGGGATGCGCATGATCGCAAAATCGCATTGTTG
CCAAACTAGTCCCAGCGTGCATGGAAGGTATATCTCTTGTAGCTGAGATATTCTGGACTT
TGCGGACTACCTCTTTACGAAGCGCGTTCAAATTGACGCAGGGACATTCTGCCACACGC
CCTCTATTCATTCAGATATTTTCCGGTTGGTCGAGTGACGTCCCAGACCCATAAACTTATG
CAAGAGCCGTCGTCCGGTTACTTGTGAAGTGAACGAGATCGAAATACAATAAAGCTGAG
GTAAGTTCCGGTTAGGGAACTGCCCTAGCCATCTTGCTGCGCAGCCCTGGGATCGGCGC
CGGGGCATAAAGGATTCGCGGTGGTTTGTCCCCTGTGGTGGAACACTGTGGTCTCGTAA
GTCGGCGTGATCTGGCGGAGATTAGGCTCCACAGGCGTCGGCGCCAGCGATGATGAGGT
CCGCGCCCCCGGTTGATACGGGCAACCGATGGAGGGGATCGAGGGTTACCATAAACTTA
CCGTGAACAATATAGTAATCGTTCCCTAGTTTTATAGATTTGGGCTCACTGCGACAGTCG
GGTCCGCGACTATACTTATTGTACACGCTGGCTGAATTACTAAGCCTGCGAGAATCGATC
GAGCTCTGGGGGGTGTCGACGTATGTGTAGATAGGACGGCTAGATCATGAGAAGTGCTA
CCTACTGACATAGAAGGTAGTTTTTGACGGGCGGCCTCGCCGATTCCTTACAATGGGGG
GGTACGTAGGATCAACGCGAATCTCCTCCGACATATAATACGCTGAAGTCACGTAATGCT
CTTACTCCCCACACACCGGTATAATACACGTCGCTAGGCTCTATAGTATAACTTGACGGCT
GAATAGGGGTATAACCGTCTTAGTTTACCTCTACGACCCAGGCAATCGGAAGGTGGAAC
CTGTAACTCCAAGAGCAGACATGCGATGTATCGCGACTATCCCCGCCTTCAACGGCTCG
GAGTAGGGTCGTCCAGGAAACAGTAAGCGATGTTTGGGTTCCGGTTCCGGGCCAGTTAT
TTTCACGTTTTTTACGGGCGAGCCGCAGTCAACAAATGGCCCGTGAACATACGATCTTCT
GTCGGACGTTGGCTATGCCCGCCCACTCGGGAGCTACTAGGGTCAGAAATATCAGGTATC
GTCATGGACTACGGAGTAGTAAAGAGCCGGAACGGATGTACACCATCTGAGGTGAACG
CGCTCAGTCAGAGCAATTTCCTCGTGACTGTATCTGCGGTTAAGGGCGACGGTTTAGGAT
AGGCCTTTACTACGTGGGAAGTCTACCGACTCGCTTGGGTACCAAGACGATTAGATATGT
CGGTAAGACCAAGGAAGAACAGGAGCACCGAGGTTTGACCCCATCATCTTCCTCAGGG
TGCCGCGTGGTATGAGTTACTTTGCGTAACCGTTACGACAAGAGCTAATCCGCATGTTAC
AACTCACTAGCAAGCTCCTCGCTCCGGGCTCTCAATCTGGATCCGTTTATTCAACCTGTC
CTTATGCCCTGGTATGGAAACGGACGGTAGCACCTCCGAGAGCGAAAGTGGGATTTCGG
GATCGGTGCAGGGTGCGTATCTACACGTATTAATCGTTGGCCTATCATCTAGCCGTTCACA
AGGGACCTGTGCGGCGAATCAAAATTTTTGTTCGTAAAACTCCCGGTTCGTATCTGATTA
TGATGTAGCCGCTGGCTTAGTCTTTGATTCGAACGAGTCATTAGGTCTCTACCCAAGTAA
ACCTCAGAAAGATGTTTCGACCGATTCATAACCACGGGGTCAGTCATAAGATGGTGGTTA
TCCTAGGTGCATATGAAGTTGTTTGCATGTCGTGAATGCGCCTTTTGAATCCTCCGGTGAT
AATGATCACACGTTTGCCCTATAGCGTGAGGCAAATTGTTCCCTCCCCAACCAAGAACA
ATTTGTTGCTAGCTCACCGGGTAACTTGCGATTGGCTTGCGACAAAAAGAACGTTAGAG
TCTCCCAACCGCGCCATTAAATATAACGGGCCCCGACTGGCGCAACTAACTAGTTGCATA
CGCGGACAAACCAAAGGCGAACATTACATGTGACGCTATACATCGTCTACGGGATAATCC
TACTCCGTCCATCACCGAAATTTGACAAGCCCTTCATAGGTCATGGTAGTGTGCTTAATC

ACCCTCGGTCAGAGTAACAGTGCTAACGTAAATCTACAAGCTTGATCGTCTATCGAAGCC
AGTACTACTACGTCTCGCATAAGTAGGATGTGGCGCAGAAACACTGGTTTGGGATAGGA
CCCACCAGCGCTAGACCCTGTTGTCACCAATGAAGGCGTCATCTGAAGAGTGAGTTCTC
TTGGGTAGGCTAAAGGGTGGGCGCTTCAGGTTAGCCCACAGCTTGATGCATGTAACTGA
GGACACCTCCAGCAAGAAGCTGTTTGCGTGAAGCGAGGGCT'

pattern=s.replace('A', '%temp%').replace('T', 'A').replace('%temp%', 'T').replace('C', '%temp
%').replace('G', 'C').replace('%temp%', 'G')

print(pattern[::-1])

49.Introduction to the Bioinformatics Armory

s='GCTTTAGCATGTGTGTATATGCATGATTCGAAACCTGCTGTAGCAACACGCCAGGTAAT
AAGTGTTGTTTGAGCAAGAGCGCTGTACGATATGGAGTGGCTCACAGTGTACTTTAACG
CTGAGTCAGTTGGACGCAGGCACCGATGCCCAAGCCTAAGCCTGGCAATAAGAGTGCAT
GCTGTTCCTCCACAGCCGAATTAGTACGCTTGGTTCGACGCAATGTACGTCCGCCGTAAC
CTTACGGCGACCGTATGCTAAAGATTGTTTATCAACTCCTCGGTCATAGATGTCCCTGAC
GATGGGGACGGTTGTTCCCTAAATCCATGCCTTCATGTGAGCACAGGAGTGGTCTAGAG
GTACTTCTTATTCTGTAGGTGGCTGCTAGGCAAGTTTGCGGAGTCGCTACACTACCACTC
CACCCGGAACGCATGGGAGCGCTGGTATACTTCTGGCACGTCGTTAACTGGGTGGCTAA
GGAATCTGCAAGTCAAAGGCCCGCTCGGGTCGCCTCGAGTGGCGCTGTGTGCACCCGA
ACAAGCCAGCCTCGGGGACCCACTCGAAGTCGAGGTGGTTTTTATCCAATTGGTTGGAG
GAACCCGGTATCCGTAAATCAGGCCCCGAAAGCCAAGCTGCATACAAGTGGGTCTACTA
GCAACTAACAGGGAGAGTAGATCATCACAACTCCTGGTTGCCCTAGTGTTCCGACCATC
TTCGCGGTAACGTCTCTACAAGTAGTACAACCCGATGCTGCGGCAGGACATCATCTGAG
TCTTATTCTCCTTACTAGCTTCCTCAGTTACAGCTGCAGTAGGCCCGATATCCGAATCCGC
GATTTGATGATTTTTGGGTG'

A=s.count("A")

C=s.count("C")

G=s.count("G")

T=s.count("T")

print(A)

print(C)

print(G)

print(T)

50.Compute the Number of Times a Pattern Appears in a Text

s='GTACTCGGTACTCGGTACTCGGTACTCGGCTTAATTGAACTACTCGGTATCTCACGTAC
TCGGCTCCTACTCGGCTACTCGGTACTCGGGGTTACTCGGTGTTACTCGGTCCTGCTACT
CGGGATACTCGGTACTCGGGTACTCGGTGAGTGGGCTACTCGGGATACTCGGTAGTACTC
GGTACTCGGTACTCGGCAAGAGTCATACTCGGTACTCGGTACTCGGCCTACTCGGAGTAC

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TCGGGTTGGTATGTACTCGGTGTACTCGGGAAACATCTACTCGGCAGCGTTACTCGGGTG
ACTACTCGGAGGGCTGTACTCGGGTTACTCGGTAGCCCGCTCAGCTACTCGGCCTTACTC
GGACTACTCGGCTACTCGGTACTCGGATTACTCGGACACTACTCGGGTACTCGGATACTC
GGTTCCATACTCGGCTATGTTACTCGGCTACTCGGGTACTCGGTACTCGGTACTCGGTTAA
TGGAGCTACTCGGTTCATACTCGGGTTCTTACTCGGCCTACTCGGTACTCGGTACTCGGT
TACTCGGGTACTCGGAATACTCGGAAGTACTCGGAATACTCGGCGTGGAGAGATACTCG
GATACTCGGGCGATACGCGAATGTTTACTCGGTACTCGGCTACTCGGATTACTCGGACTA
CTCGGTACTCGGATATACTCGGCGTACTCGGAATTCCGTACTCGGTACTCGGTAGATACTC
GGTACTCGGACATACTCGGTACTCGGGCTACTCGGGGCGCTTAGCGATACTCGGAGTACT
CGGCCTGCCAAGTACTCGGTACTCGGATTTTACTCGGGTAATACTCGGCTACTCGGAATT
ATACTCGGTACTCGGGTTTACTCGGGTACTCGGTACTCGGCTTACTCGGAACTACTCGGG
TCTACTCGGTACTCGGGACCTTACTCGGACAGCTACTCGG'
t='TACTCGGTA'
loc=[]
lengthS= len(s)
lengthT=len(t)
count=0
for i in range (0, lengthS-lengthT+1):
    if s[i:i+lengthT]==t:
        count=count+1
print(count)
```