

HW 1 Assignment

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#include <stdio.h>
#include <stdlib.h>
#include <string.h>

void binary_strand(int len, int arr[], char str[]){
    int i;
    for(i=0;i<len;i++){
        if(str[i] == 'A' || str[i] == 'T'){
            arr[i] = 0;
        }
        else if(str[i] == 'C' || str[i] == 'G'){
            arr[i] = 1;
        }
        else{
            printf("Invalid DNA molecule strand entered\n");
            exit(0);
        }
    }
}

void complementary_strand(int len, char str[]){
    int i;
    for(i=0;i<len;i++){
        if(str[i] == 'A'){
            printf("T");
        }
        else if(str[i] == 'T'){
            printf("A");
        }
        else if(str[i] == 'C'){
            printf("G");
        }
        else if(str[i] == 'G'){
            printf("C");
        }
    }
}

int binding_energy(int len, int arr[]){
    int i;
    int count_0=0;
    int count_1=0;
    int total;
```

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for(i=0;i<len;i++){
    if(arr[i] == 0){
        count_0++;
    }
    else{
        count_1++;
    }
}

int total_0 = 2*count_0;
int total_1 = 3*count_1;
total = total_0+total_1;
return total;
}

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int main(void){
    int len;
    printf("Enter length of DNA strand: ");
    scanf("%d", &len);
    int arr[len];
    char str[len];
    printf("Enter DNA strand of length %d : \n",len);
    scanf("%s",str);
    int i;
    binary_strand(len,arr,str);
    printf("Complementary DNA strand: ");
    complementary_strand(len,str);
    printf("\n");

    //Part1
    printf("i) Sequence of DNA molecule in 0,1 format is (0 if A,T and 1 if C,G):\n");
    for(i=0;i<len;i++){
        printf("%d",arr[i]);
    }
    printf("\n");

    //Part 2
    printf("ii) Total binding energy of given DNA molecule: ");
    printf("%dEK(b)T\n", binding_energy(len, arr));

    //Part3
    printf("iii) To compare melting points of 2 DNA molecules\n");
    printf("Enter length of 1st DNA strand: ");
    int len1;
    scanf("%d",&len1);
    printf("Enter length of 2nd DNA strand: ");

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int len2;
scanf("%d",&len2);

char str1[len1];
char str2[len2];
int arr1[len1];
int arr2[len2];
printf("Enter DNA strand 1 of length %d:\n",len1);
scanf("%s",str1);
binary_strand(len1,arr1,str1);
printf("Enter DNA strand 2 of length %d:\n",len2);
scanf("%s",str2);
binary_strand(len2,arr2,str2);


printf("Complementary DNA strand 1: ");
complementary_strand(len1,str1);
printf("\n");
int b1 = binding_energy(len1,arr1);


printf("Complementary DNA strand 2: ");
complementary_strand(len2,str2);
printf("\n");
int b2 = binding_energy(len2,arr2);
printf("Lower the binding energy, lower the melting point of the DNA molecule\n");
if(b1>b2){
    printf("DNA molecule 2 has lower melting point that DNA molecule 1\n");
}
else if(b1<b2){
    printf("DNA molecule 1 has lower melting point that DNA molecule 2\n");
}
else{
    printf("Both DNA molecules have same melting point\n");
}

}

```

Input Output format:

Sample 1:

Enter length of DNA strand: 11

Enter DNA strand of length 11 :

AATCAGCTAGC

Complementary DNA strand: TTAGTCGATCG

i) Sequence of DNA molecule in 0,1 format is (0 if A,T and 1 if C,G):

00010110011

ii) Total binding energy of given DNA molecule: 27EK(b)T

iii) To compare melting points of 2 DNA molecules

Enter length of 1st DNA strand: 6

Enter length of 2nd DNA strand: 8

Enter DNA strand 1 of length 6:

CGCATT

Enter DNA strand 2 of length 8:

CCAGTAAG

Complementary DNA strand 1: GCGTAA

Complementary DNA strand 2: GGTCATTC

Lower the binding energy, lower the melting point of the DNA molecule

DNA molecule 1 has lower melting point than DNA molecule 2

Sample 2:

Enter length of DNA strand: 6

Enter DNA strand of length 6 :

AGTAFA

Invalid DNA molecule strand entered

Sample 3:

Enter length of DNA strand: 7

Enter DNA strand of length 7 :

AGTAAGC

Complementary DNA strand: TCATTCG

i) Sequence of DNA molecule in 0,1 format is (0 if A,T and 1 if C,G):

0100011

ii) Total binding energy of given DNA molecule: 17EK(b)T

iii) To compare melting points of 2 DNA molecules

Enter length of 1st DNA strand: 5

Enter length of 2nd DNA strand: 6

Enter DNA strand 1 of length 5:

AGGGGT

Enter DNA strand 2 of length 6:

GACATAA

Complementary DNA strand 1: TCCCC

Complementary DNA strand 2: CTGTAT

Lower the binding energy, lower the melting point of the DNA molecule

Both DNA molecules have same melting point

