1. Write a program in C which will take a string as input and count total number of alphabets, digits and special characters in a string.

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>//2204044
#include<string.h>//2204044
void countChar(int *digit, int *alpha, int *special, char *str) {
    for(int i = 0; str[i] != '\0'; i++) {
        int temp = str[i];//2204044
        if(temp >= 65 && temp <= 90 || temp >= 97 && temp <= 122) {
            (*alpha)++;//2204044
        } else if(temp >= 48 && temp <= 57) {
            (*digit)++;//2204044
        } else {
            (*special)++;//2204044
        }
    }
}
int main(){
    char str[80];//2204044
    printf("Enter String :");//2204044
    gets(str);//2204044
    int digit,alpha,special;//2204044
    digit=alpha=special=0;//2204044
    countChar(&digit,&alpha,&special,str
    printf("Digit :%d\nAlphabet: %d\nSpe
    return 0;//2204044
}
```

```
"C:\Users\MohatamimHaque\
Enter String :"R#9%P2a^6@L!4f*5v@0qT3!G8zW&1yX"
Digit :9
Alphabet: 13
Special Character:11
Process returned 0 (0x0)   execution time : 44.3
Press any key to continue.
```

3. Write down a function that compares two strings and returns 1 if they are same and returns 0 otherwise.

problem2.c | problem3.c | problem4.c

```c
#include <stdio.h>//2204044
int compare(char *str1,char *str2){
    for(int i=0;str1[i]!='\0';i++){
        if(str1[i] != str2[i]){
            return 0;//2204044
        }
    }
    return 1;//2204044
}
int main(){
    char str1[100],str2[100];//2204
    printf("Enter Two String :");//
    gets(str1);//2204044
    gets(str2);//2204044
    printf("%d",compare(str1,str2))
    return 0;//2204044
}
```

```
"C:\Users\MohatamimHaque\
Enter Two String :Mohatamim
haque
0
Process returned 0 (0x0)   exe
Press any key to continue.
```

2. Write down a program that will take a word as input and will determine whether the word is palindrome or not.

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>//2204044
#include<string.h>//2204044
int check_palindrome(char *str){
    int size=0,is=1;//2204044
    for(int i=0;str[i]!='\0';i++){
        size++;//2204044
    }
    char newStr[size+1];//2204044
    int j=0;//2204044
    for(int i=size-1;i>=0;i--){
        newStr[j++]=str[i];//2204044
    }
    newStr[j]='\0';//2204044
    for(int i=0;str[i]!='\0';i++){
        if(str[i] != newStr[i]){
            return 0;//2204044
        }
    }
    return 1;//2204044
}
int main(){
    char str[80];//2204044
    printf("Enter String :");//220404
    gets(str);//2204044
    if(check_palindrome(str)){
        printf("Word is palindrome");
    }else{
        printf("Word is not palindrom
    }
    return 0;//2204044
}
```

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```
Enter String :annanna
Word is palindrome
Process returned 0 (0x0)   ex
Press any key to continue.
```

4. Write a C program to check whether a given substring is present in the given string.

Enter a string: **This is a test string**.

Enter substring: **string**

Expected Output: '**string'** exists as a substring in the string

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>
int strSize(char *str);
int isSubstring(char *mainStr,char *sub
int main(){
    char mainStr[100],subStr[100];
    printf("Mainstring :");
    gets(mainStr);
    printf("Substring :");
    gets(subStr);
    if(isSubstring(mainStr,subStr))
        printf("Found\n");
    else
        printf("Not Found\n");
    return 0;
}
int isSubstring(char *mainStr,char *sub
    int m=strSize(mainStr);
    int n=strSize(subStr);
      for (int i = 0; i <= m - n; i++)
        int j;
         for (j = 0; j < n; j++)
            if (mainStr[i + j] != subSt
                break;
         if (j == n)
            return 1;
    }
    return 0;
}
int strSize(char *str){
    int size=0;
    while(str[size]!='\0') size++;
    return size;
}
```

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```
Mainstring :appleisagoodfurit
Substring :sagood
Found

Process returned 0 (0x0)   executio
Press any key to continue.
```

5. Using pointer arithmetic,

a. Write a C program to take input and print elements of an array.

b. Write a C program to copy one array to another.

c. Write a program to search for an element in an array.

d. Write a program to print the reverse of a string

problem5a.c | problem5b.c | problem5c.c | problem5d.c

```c
#include<stdio.h>//2204044
void dataInput(int *list,int size){
    printf("Enter array element one by
    for(int i=0;i<size;i++){
        scanf("%d",list+i);//2204044
    }
}
void dataOutput(int *list,int size){
    printf("Array elements :");//220404
    for(int i=0;i<size;i++){
        printf("%d ",*(list+i));//22040
    }
}
int main(){
    int size;//2204044
    printf("Array size :");//2204044
    scanf("%d",&size);//2204044
    int list[size];//2204044
    dataInput(list,size);//2204044
    dataOutput(list,size);//2204044
    return 0;//2204044
}
```

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```
Array size :9
Enter array element one by one :
9 3 4 2 1 8 14 36 21
Array elements :9 3 4 2 1 8 14 36 21
Process returned 0 (0x0)   execution t
Press any key to continue.
```

problem5a.c | problem5b.c | problem5c.c | problem5d.c

```c
#include<stdio.h>//2204044
void dataInput(int *list,int size){
    printf("Enter array element one by one :")
    for(int i=0;i<size;i++){
        scanf("%d",list+i);//2204044
    }
}
void dataOutput(int *copyList,int size){
    printf("After Copy :");//2204044
    for(int i=0;i<size;i++){
        printf("%d ",*(copyList+i));//2204044
    }
}
void dataCopy(int *list,int *copyList,int size
    for(int i=0;i<size;i++){
        *(copyList+i)=*(list+i);//2204044
    }
}
int main(){
    int size;//2204044
    printf("Array size :");//2204044
    scanf("%d",&size);//2204044
    int list[size];//2204044
    int copyList[size];//2204044
    dataInput(list,size);//2204044
    dataCopy(list,copyList,size);//2204044
    dataOutput(copyList,size);//2204044
    return 0;//2204044
}
```

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```
Array size :6
Enter array element one by one
2
3
6
1
12
19
After Copy :2 3 6 1 12 19
Process returned 0 (0x0)   exec
Press any key to continue.
```

problem5a.c | problem5b.c | problem5c.c | problem5d.c

```c
#include<stdio.h>//2204044
void dataInput(int *list,int size){
    printf("Enter array element one by
    for(int i=0;i<size;i++)
        scanf("%d",list+i);//2204044
}
int search(int *list,int size){
    printf("Enter searched element :");
    int data;//2204044
    scanf("%d",&data);//2204044
    for(int i=0;i<size;i++)
        if(*(list+i)==data)
            return i+1;//2204044
    return 0;//2204044
}
int main(){
    int size;//2204044
    printf("Array size :");//2204044
    scanf("%d",&size);//2204044
    int list[size];//2204044
    int copyList[size];//2204044
    dataInput(list,size);//2204044
    int fg=search(list,size);//2204044
    if(fg)
        printf("Position :%d",fg);//220
    else
        printf("Not found");//2204044
    return 0;//2204044
}
```

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```
Array size :14
Enter array element one by one :52
1
4
1
52
411
25
21
23
2
3
212
23
63
Enter searched element :25
Position :7
Process returned 0 (0x0)   execution
Press any key to continue.
```

problem5a.c | problem5b.c | problem5c.c | problem5d.c

```c
#include<stdio.h>//2204044
#include<string.h>//2204044
void reverse(char *str,char *rev){
    int i,size=0,j=0;//2204044
    while(str[size]!='\0'){
        size++;//2204044
    }
    for(i=size-1;i>=0;i--){
        rev[j++]=str[i];//2204044
    }
    rev[j]='\0';//2204044
}
int main(){
   char str[80],rev[80];//2204044
   printf("Enter a string :");//2204044
   gets(str);//2204044
   reverse(str,rev);//2204044
   printf("Reverse string :%s",rev);//220
    return 0;//2204044
}
```

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```
Enter a string :mohatamim
Reverse string :mimatahom
Process returned 0 (0x0)   execution t
Press any key to continue.
```

6. Write a function that to swaps two numbers using pointers.

problem6.c | problem7.c | problem8.c

```c
#include<stdio.h>//2204044
int swap(int *x,int *y){
    *x=*x+*y;//2204044
    *y=*x-*y;//2204044
    *x=*x-*y;//2204044
}
int main(){
    int a,b;//2204044
    printf("Enter two numb
    scanf("%d %d",&a,&b);
    swap(&a,&b);//2204044
    printf("After swapping
    return 0;//2204044
}
```

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```
Enter two numbers :35 87
After swapping:87,35
Process returned 0 (0x0)   execution time : 21.
Press any key to continue.
```

7. Write a C program to access two dimensional array using pointers.

problem6.c | problem7.c | problem8.c

```c
#include <stdio.h>//2204044
int main() {
    int rows, cols;//2204044
    printf("Enter the number of rows: ");//220
    scanf("%d", &rows);//2204044
    printf("Enter the number of columns: ");//
    scanf("%d", &cols);//2204044
    int *array[rows][cols];//2204044
    printf("Enter elements of the array:\n");//
    for (int i = 0; i < rows; i++) {
        for (int j = 0; j < cols; j++) {
            scanf("%d", &array[i][j]);//220404
        }
    }
    printf("data elemnets:\n");//2204044
    for (int i = 0; i < rows; i++) {
        for (int j = 0; j < cols; j++) {
            printf("%d ", array[i][j]);//22040
        }
        printf("\n");//2204044
    }
    return 0;//2204044
}
```

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```
Enter the number of rows: 4
Enter the number of columns: 5
Enter elements of the array:
78 96 35 12 14
51 14 18 96 64
43 52 39 68 71
56 17 16 31 87
data elemnets:
78 96 35 12 14
51 14 18 96 64
43 52 39 68 71
56 17 16 31 87

Process returned 0 (0x0)   exec
Press any key to continue.
```

8. Write a program to dynamically allocate a two dimensional (m*n) array. Take the dimensions m and n as input.

problem6.c | problem7.c | problem8.c

```c
#include<stdio.h>//2204044
#include <stdlib.h>//2204044
void getArray(int *list,int m,int n){
    for(int i=0;i<m*n;i++){
        scanf("%d",list+i);//2204044
    }
    printf("Entered 2D array:\n");//220
    int j=0;//2204044
    for(int i = 0; i < m*n; i++) {
        printf("%d ", *(list+i));//2204
        j++;//2204044
        if(j%n==0){
            printf("\n");//2204044
        }
    }
}
int main(){
    int m,n;//2204044
    printf("Enter row column numbers [m
    scanf("%d %d",&m,&n);//2204044
    int list[m][n];//2204044
    getArray(list,m,n);//2204044
    return 0;//2204044
```

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```
Enter row column numbers [m,n]:
4 3
45 78 13
16 63 78
81 33 53
75 12 16
Entered 2D array:
45 78 13
16 63 78
81 33 53
75 12 16

Process returned 0 (0x0)   execu
Press any key to continue.
```

Structure:

9. Create a structure called "Student" with members name, age, and total marks. Write a C program to input data for two students, display their information, and find the average of total marks.

problem9.c

```c
#include<stdio.h>//2204044
typedef struct Student{
    char name[50];//2204044
    int age, total_marks;//2204044
}info;//2204044
info dataInput(){
    info s;//2204044
    printf("Enter name: ");//2204044
    gets(s.name);//2204044
    printf("Enter age and total marks:
    scanf("%d %d", &s.age, &s.total_ma
    getchar();//2204044
    return s;//2204044
}
int dataOutput(info *s){
    printf("Name :%s\nAge :%d\nTotal m
        s->name,s->age,s->total_marks)
}
int main(){
    info s[2];//2204044
    int total_marks=0;//2204044
    for(int i=0;i<2;i++){
        printf("Student :%d\n",i+1);//
        s[i]=dataInput();//2204044
    }
    printf("Data Output :");
    for(int i=0;i<2;i++){
        printf("\nStudent :%d\n",i+1);
        dataOutput(&s[i]);//2204044
        total_marks+=s[i].total_marks;
    }
    double average = total_marks/2.0;/
    printf("\nAverage :%.2f",average);
    return 0;
}
```

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```
Student :1
Enter name: Mohatamim
Enter age and total marks:
22 459
Student :2
Enter name: Raju Bhai
Enter age and total marks:
22 449
Data Output :
Student :1
Name :Mohatamim
Age :22
Total marks:459
Student :2
Name :Raju Bhai
Age :22
Total marks:449
Average :454.00
Process returned 0 (0x0)
Press any key to continue.
```

10. Create a structure named Complex to represent a complex number with real and imaginary parts. Write a C program to add and multiply two complex numbers.

problem9.c problem10.c

```c
#include<stdio.h>//2204044
typedef struct Complex{
    int real;//2204044
    int imaginary;//2204044//2204044
}complex;//2204044
complex addComplex(complex num1,complex num2){
    complex sum;//2204044
    sum.real=num1.real+num2.real;//2204044
    sum.imaginary=num1.imaginary+num2.imaginary;//2204044
    return sum;//2204044
}
complex multiplyComplex(complex num1,complex num2){
    complex product;//2204044
    product.real=num1.real*num2.real-num1.imaginary*num2.imaginary;//2204044
    product.imaginary=num1.imaginary*num2.real+num2.imaginary*num1.real;//2204044
    return product;//2204044
}
int main(){
    complex num1,num2,sum,product;//2204044
    printf("Enter real and imaginary parts of first complex number: ");//2204044
    scanf("%d %d",&num1.real,&num1.imaginary);//2204044
    printf("Enter real and imaginary parts of second complex number: ");//2204044
    scanf("%d %d",&num2.real,&num2.imaginary);//2204044
    sum=addComplex(num1,num2);//2204044
    printf("Sum :%d%c%di\n",
           sum.real,sum.imaginary<0?'\0':'+',sum.imaginary);//2204044
    product=multiplyComplex(num1,num2);//2204044
    printf("Product :%d%c%di\n",
           product.real,product.imaginary<0?'\0':'+',product.imaginary);//2204044
}
```

```
"C:\Users\MohatamimHaque\
Enter real and imaginary parts of first complex number: 9 8
Enter real and imaginary parts of second complex number: -5 6
Sum :4+14i
Product :-93+14i

Process returned 0 (0x0)   execution time : 8.218 s
Press any key to continue.
```

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>
int tobase10(char c[],int length,int base);//2204044
int power(int base,int exponent);//2204044
int isPrime(int n);//2204044
int reverseNumber(int n);//2204044
int main(){
    int length,base;//2204044
    printf("Enter length of Array :");//2204044
    scanf("%d",&length);//2204044
    char arr[length+1];//2204044
    getc(stdin);//2204044
    printf("Enter Array Elements :");//2204044
    gets(arr);//2204044
    printf("Enter Base :");//2204044
    scanf("%d",&base);//2204044
    int base10=tobase10(arr,length,base);//2204044
    printf("Decimal value: %d\n",base10);//2204044
    if(isPrime(base10))
        if(isPrime(reverseNumber(base10)))
            printf("Status: Both prime and Emirp");//2204044
        else
            printf("Status: Prime");//2204044
    else
        printf("Status: None");//2204044
    return 0;//2204044
}
//convert character array to corresponding decimal value
int tobase10(char c[],int length,int base){
    int dec=0;//2204044
    for(int i=0;i<length;i++)
        dec+=(c[i]-48)*power(base,length-i-1);//2204044
    return dec;//2204044
};//2204044
//exponent function
int power(int base,int exponent){
    if(exponent>0)
        return base*power(base,exponent-1);//2204044
    return 1;//2204044
}
//prime number check
int isPrime(int n){
    for(int i=2;i<n/2;i++)
        if(n%i==0)
            return 0;//220404
    return 1;//2204044
}
//reverse a number
int reverseNumber(int n){
    int temp=0;//2204044
    while(n>0){
        temp=temp*10+n%10;//2
        n/=10;//2204044
    }
    return temp;//2204044
}
```

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```
Enter Array Elements :382
Enter Base :8
Decimal value: 258
Status: None
Process returned 0 (0x0)   execution time : 70.7
35 s
Press any key to continue.
```

Problem 2:

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>
int power(int base,int p);//2204044
int sum(int a,int r,int n);//2204044
int main(){
    int a,r,n;//2204044
    printf("First Term(a) :");//2204044
    scanf("%d",&a);//2204044
    printf("Common ratio(r) :");//2204044
    scanf("%d",&r);//2204044
    printf("Terms(n):");//2204044
    scanf("%d",&n);//2204044
    printf("%d",sum(a,r,n-1));//2204044
    return 0;//2204044
}
int power(int base,int p){
    if(p>0){
        return base*power(base,p-1);//2204044
    }
    return 1;//2204044
}
int sum(int a,int r,int n){
    if(n>0){
       return a*power(r,n)+sum(a,r,n-1);//2204044
    }
    return a;//2204044
}
```

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```
First Term(a) :4
Common ratio(r) :6
Terms(n):9
8062156
Process returned 0 (0x0)   execution time : 9.860 s
Press any key to continue.
```

Problem3:

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>
int isPrime(int n);//2204044
int reverse(int n);//2204044
int main(){
    int n,rev;//2204044
    while(1){
        scanf("%d",&n);//2204044
        if(n==0)
            break;//2204044
        else if(n==1)
            printf("%d is not prime",n);//2204044
        else if(n>1)
            if(isPrime(n))
                if(isPrime(reverse(n)))
                    printf("%d is an emirp",n);//2204044
                else
                    printf("%d is a prime",n);//2204044
            else
                printf("%d is not prime",n);//2204044

    printf("\n");//2204044
    }
    return 0;//2204044
}
int isPrime(int n){
    for(int i=2;i<=n/2;i++){
        if(n%i==0)
            return 0;//2204044
    }
    return 1;//2204044
}
int reverse(int n){
    int temp=0;//2204044
    while(n>0){
        temp=temp*10+n%10;//220
        n/=10;//2204044
    }
    return temp;//2204044
}
```

"C:\Users\MohatamimH

```
37
37 is an emirp
83
83 is a prime
8458
8458 is not prime
98
98 is not prime
111131
111131 is not prime
3231
3231 is not prime
0

Process returned 0 (0x0)   exe
170 s
Press any key to continue.
```

Problem4:

problem2.c | problem3.c | problem4.c

```c
#include<stdio.h>
int strSize(char *str);//2204044
int isSubstring(char *mainStr,char *subStr);//2204044
int main(){
    char mainStr[100],subStr[100];//2204044
    printf("Mainstring :");//2204044
    gets(mainStr);//2204044
    printf("Substring :");//2204044
    gets(subStr);//2204044
    if(isSubstring(mainStr,subStr))
        printf("Found\n");//2204044
    else
        printf("Not Found\n");//2204044
    return 0;//2204044
}
int isSubstring(char *mainStr,char *subStr){
    int m=strSize(mainStr);//2204044
    int n=strSize(subStr);//2204044
      for (int i = 0; i <= m - n; i++) {
        int j;//2204044
        for (j = 0; j < n; j++)
            if (mainStr[i + j] != subStr[j])
                break;//2204044
        if (j == n)
            return 1;//2204044
    }
    return 0;//2204044
}
int strSize(char *str){
    int size=0;//2204044
    while(str[size]!='\0') size++;//2204044
    return size;//2204044
}
```

```
"C:\Users\MohatamimHaque\
Mainstring :Bangladesh is beautiful country
Substring :beautiful
Found
```