1. **Keyboard থেকে a,b,c read করে এবং নিচের সমীকরনের এর x এর value বের করার program লিখ। তবে b-c এর value zeroএর সমান নয়। x=a/(b-c)**

```
#include<stdio.h>
int main(){
   float a,b,c;
   scanf("%f%f%f",&a,&b,&c);
   if((b-c)!=0){
      printf("x=%f", a/(b-c));
   }
}
```

2. **Relationship between Celsius and Fahrenheit is governed by the form are f= (9*c/5)+32. Write a program to convert the temperature.**
   - **(a) Celsius to Fahrenheit.**
   - **(b) Fahrenheit to Celsius.**

Solution: (a)

```
#include <stdio.h>
int main(){
   float C, F;
   scanf("%f",&C);
   F= (C*9/5)+32;
   printf("%.3f Fahrenheit",F);
   return 0;
}
```

(b) . Self Study

3. ত্রিভুজের তিনটি বাহু a,b,c তবে ত্রিভুজের ক্ষেত্রফল বের কর।

Solution:

```
#include<stdio.h>
#include<math.h>
int main(){
   float a,b,c,s,area;
   scanf("%f%f%f",&a,&b,&c);
   if(a+b>c&&b+c>a&&c+a>b){
      s=(a+b+c)/2;
     area=sqrt(s*(s-a)*(s-b)*(s-c));
     printf("%.3f",area);
   }
   else{
     printf("The traingle is not
possible");
   }
}
```

4. Circle এর পরিধির উপর দুইটি বিন্দু (2,2) এবং (5,6) কে সংযোগ করার পর একটি সরল রেখা পাই। যদি রেখাটি বৃত্তের ব্যাস হয় তাহলে বৃত্তের ক্ষেত্রফল বের কর।

Solution:

```
#include<stdio.h>
#include<math.h>
int main(){
   int x1=2,y1=2,x2=5,y2=6;
   float r,pi=3.1416;
   r=(sqrt((x1-x2)*(x1-x2)+(y1-y2)*(y1-y2)))/2;
   printf("%f",pi*r*r);
}
```

5. Bitwise operator ব্যবহার করে Integer number এর even এবং odd সংখ্যাগুলোর যোগফল বের কর।

Solution:

```
#include<stdio.h>
int main( ){
   int n,i,even=0,odd=0;
   scanf("%d",&n);
   for(i=1;i<=n;i++){
      if(i&1){
         odd=odd+i;
      }
      else{
         even=even+i;
      }
   }
   printf("Even=%d \n Odd=%d ",even,odd);

}
```

6. নিচের দুইটি একমাত্রিক সমীকরণ থেকে অজানা x_1 ও x_2 এর value বের করার লিখ।

$$a x_1 + b x_2 = m$$
$$c x_1 + d x_2 = n$$

condition :

(i) হর ad-cb!=0 হবে না।

(ii) input : a,b,c,d,m,n

(iii) যদি ad-cb=0 হয়, তাহলে print কর No solution.

Solution:

```
#include<stdio.h>

int main(){

   float a,b,m,c,d,n;

   scanf("%f%f%f%f%f%f",&a,&b,&m,&c,&d,&n);

   a*d-c*b==0?printf("No solution."):printf("x1=%f\nx2=%f",(m*d-b*n)/(a*d-c*b),(n*a-m*c)/(a*d-c*b));

}
```

7. নিচের floyd's triangle print করঃ

(a)
1
23
456
78910

(b)
1
01
101
1010

Solution: (a)

```
#include<stdio.h>
int main(){
   int i,k,n,r=0;
   scanf("%d",&n);
   for(i=1;i<=n;i++){
      for(k=1;k<=i;k++){
         printf("%d ",++r);
         }
      printf("\n");
   }
```

Solution: (b)

```
#include<stdio.h>
int main(){
   int i,k,n,p=1;
   scanf("%d",&n);
   for(i=1;i<=n;i++){
        p=i%2?1:0;
      for(k=1;k<=i;k++){
         printf("%d ",p);
         p=p==0?1:0;
      }
```

8. Write a program that will read the value of x and evaluate the following function.
****

$$Y = \begin{cases} 1 \text{ for } x>0 \\ 0 \text{ for } x=0 \\ -1 \text{ for } x<0 \end{cases}$$

Solution:

```
#include<stdio.h>
int main(){
   int x;
   scanf("%d",&x);
   printf(" x=%s ",x>0 ? " 1 " : x==0?" 0 " : " -1 ");
}
```

9. Recursive function ব্যবহার করে যেকোন factorial number এর Value বের করার program লিখ।

Solution:

```
#include<stdio.h>

int fact(int n){

   return n==0||n==1 ? 1 : n*fact(n-1);

}

int main(){

   int n,result;

   scanf("%d",&n);

  result=fact(n);

   printf("%d",result);

}
```

10. Array ব্যবহার করে minimum এবং maximum number এর Program লিখ।

***

Solutin:

```
#include<stdio.h>

int main(){

      int large,small, arr[100];
      int size,I;

      scanf("%d",&size);

      for(i=1; i<=size; i++){
            scanf("%d",&arr[i]);
      }
      large=small=arr[1];

      for(i=1; i<size; i++){

            if(arr[i+1]>large){
                  large=arr[i+1];
            }

            if(arr[i+1]<small){
                  small=arr[i+1];
            }
      }

      printf("Largest=%d\n",large);
      printf("Smallest=%d",small);

}
```

Or Using function:

```
#include <stdio.h>
void max_min(int a[], int n, int *max, int *min){
int *i;
*max = *min = a[0];
for (i=&a[0]; i<&a[n]; i++){
   if(*i>*max)
   *max=*i;
   else if (*i<*min)
   *min=*i;
  }
 }

int main(){
int N;
scanf("%d",&N);
int b[N], *i, big, small;
for( i= &b[0] ;i<&b[N]; i++)
   scanf("%d",i);

max_min(b, N, &big, &small);
printf("\nlargest:\t%d",big);
printf("\nsmallest:\t%d",small);

return 0;
}
```

11. $ax^2+bx+c=0$ দ্বিঘাত সমীকরণের ---

(a) Read: a,b,c

(b) যদি a=b=0 হয় Print : No solution

(c) যদি a=0 হয় মূল হবে একটি।

(d) যদি $b^2-4ac<0$ হয় তাহলে Print : Roots are imaginary

(e) অন্যথায় দুইটি মূল পাওয়া যাবে।

Solution:

```
#include<stdio.h>
#include<math.h>
int main(){
   float a,b,c,d,x1,x2;
   scanf("%f%f%f",&a,&b,&c);
   d=b*b-4*a*c;
   if(a==0&&b==0){
      printf("No solution");
   }
   else if(a==0){
      printf("x1=%f",-c/b);
   }
   else if(d<0){
      printf("Roots are Imaginary");
   }
   else{
      x1=(-b+sqrt(d))/(2*a);
      x2=(-b-sqrt(d))/(2*a);
      printf("x1=%f\n x2=%f",x1,x2);
   }
}
```

12. Keyboard থেকে positive integer number input করব এবং ।ঐসংখ্যাকে Reverse করব।
****

(i) Reverse number বের করব।

(ii) Reverse এর number এর ডিজিটের যোগফল।

(iv) সংখ্যাটি palindrome কিনা check করব। যদি Palindrome number হয় তাহলে print করব Palindrome অন্যথায় Not palindrome .

```
#include<stdio.h>
#include<conio.h>
int main(){
      int num, rem, orig, rev=0,sum=0;
      scanf("%d",&num);
      orig=num;
      while(num!=0){
            rem=num%10;
            num=num/10;
            rev=rev*10 + rem;
            sum=sum+rem;

      }
      printf("Reverse=%d\n summation=%d",rev,sum);
      if(rev==orig) {
            printf("Palindrome");
      }
      else{
            printf("Not Palindrome");
      }
}
```

13. **Number in the sequence 0 1 1 2 3 5 8 1 3……n are CalledFibonacci number . Write a program using recursive function to calculate and print first n Fibonacci numbers.**

Solution:

```
#include<stdio.h>

int  fibo(int n){

   return  n==0||n==1 ? n : fibo(n-1)+fibo(n-2) ;

}

int main(){

   int i,n;

  scanf("%d",&n);

   for(i=0;i<n;i++){

      printf("%d  ",fibo(i)) ;

   }

   return 0;

}
```

14. Recursive function ব্যবহার করে N- তম Fibonacci value বের করার Program কর।

Solution:

```
#include<stdio.h>
int  fibo(int n){
   return  n==0||n==1 ?  n  :  fibo(n-1)+fibo(n-2) ;
}

int main(){
   int i,n,result;
   scanf("%d",&n);
   result=fibo(n);
   printf("%d",result);
   return 0;
}
```

15. **Write a function prime that returns 1 if its arguments is a prime numbers and returns zero otherwise.**

Solution:

```
#include<stdio.h>
int isPrime(int n){
   int j;
   for( j=2 ; j<n ; j++){
      if(n%j==0){
         return 0;
       }
   }
   return 1;
}
int main(){
   int n;
   scanf("%d",&n);
   printf(" %s\n ", isPrime(n)==1 ? "YES" : "NO") ;
  return  0 ;
}
```

16. Function ব্যবহার করে 2 থেকে n পর্যন্ত prime number generate কর।

Solution:

```
#include<stdio.h>
int prime(int i){
   int j;
   for(j=2; j<i;j++){
      if(i%j==0){
         return 0;
       }
   }
   return 1;
}

int main(){
   int n,i;
   scanf("%d",&n);
   for(i=2;i<=n;i++){
     if(prime(i)==1)
      printf("%d ",i);
   }
  return  0;
}
```

17. Recursive function ব্যবহার করে নিচের দুইটি সংখ্যার মধ্যে GCD And LCM বের করার program লিখ।

Solution:

```
#include<stdio.h>

int gcd(int a,int b){

   return b==0? a  : gcd( b , a%b ) ;

}

int main(){

   int a,b;

   scanf("%d%d",&a,&b);

   printf("gcd=%d\n",gcd(a,b));

   printf("lcm=%d ", (a*b)/gcd(a,b));

}
```

18. Recursive function ব্যবহার করে নিচের series এর যোগফল বের কর।

(a) 1+2+3+4…….+ n = ?

(b) $1^2 + 2^2 + 3^2$+…….+ n^2 = ?

Solution: (a)

```
#include<stdio.h>
int sum(int n){
   return n==0||n==1? n: n+sum(n-1) ;
}
int main(){
   int n;
   scanf("%d",&n);
   printf("%d",sum(n));
}
```

Solution: (b)

```
#include<stdio.h>
int sum(int n){
   return n==0||n==1? n : n*n+sum(n-1) ;
}
int main(){
   int n;
   scanf("%d",&n);
   printf("%d",sum(n));
}
```

19. bitwise operator ব্যবহার করে দুইটি সংখ্যার মধ্যে swap অথবা interchange program লিখ।

Solution:

```
#include<stdio.h>

int main(){

 int a, b;

 scanf("%d%d",&a,&b);

 printf("a=%d, b=%d\n",a,b);

 a = a^b;

 b = a^b;

 a = a^b;

 printf("a=%d,b=%d\n",a,b);


}
```

20. convertion :

(i) Convert decimal to binary

(ii) Convert binary to decimal

Decimal to Binary Conversion

```
#include<stdio.h>

 int main(){

         int decnum, rem, quot;
        int binnum[100], i=1, j;
        scanf("%ld",&decnum);
        quot=decnum;
        while(quot!=0)
        {
                binnum[i++]=quot%2;
                quot=quot/2;
        }
        for(j=i-1; j>0; j--)
        {
                printf("%d",binnum[j]);
        }

}
```

```
/* C Program - Binary to Decimal Conversion */

#include<stdio.h>
int main()
{
        int binnum, decnum=0, i=1, rem;

        scanf("%ld",&binnum);
        while(binnum!=0)
        {
                rem=binnum%10;
                decnum=decnum+rem*i;
                i=i*2;
                binnum=binnum/10;
        }
        printf("Equivalent decimal value = %d",decnum);

}
```

21. String :

(i) Find length of string
(ii) Compare two string
(iii) Reverse string
(iv) Delete vowel from string

i.Find length of string

```
#include <stdio.h>
int main(){
   char str[1000],l;
   scanf("%s",str);
   for(l=0; str[l]!='\0'; ++l);

      printf("length= %d",l);

}
```

ii. Compare two string

```
#include <stdio.h>
int main(){
  char a[100], b[100];
  scanf("%s%s",a,b);
  if (strcmp(a,b) == 0)
    printf("The strings are equal.\n");
  else
    printf("The strings are not
equal.\n");

  return 0;
}
```

iii. Reverse string

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

int main(){
  char arr[100];

  printf("Enter a string to reverse\n");
  gets(arr);
  strrev(arr);
  printf("Reverse of the string is  %s\n", arr);

  return 0;
}
```

iv. Delete vowel from string

```
#include <stdio.h>
#include <string.h>
int check_vowel(char c){
  switch(c) {
    case 'a':
    case 'A':
    case 'e':
    case 'E':
    case 'i':
    case 'I':
    case 'o':
    case 'O':
    case 'u':
    case 'U':
      return 1;
    default:
      return 0;
  }
}

int main(){
  char s[100], t[100];
  int i, j = 0;
  printf("Enter a string to delete vowels\n");
  gets(s);                                  //input function
  for(i = 0; s[i] != '\0'; i++) {
    if(check_vowel(s[i]) == 0) {      //not a vowel
      t[j] = s[i];
      j++;
    }
  }

  t[j] = '\0';

  strcpy(s, t);    //We are changing initial string

  printf("String after deleting vowels: %s\n", s);

  return 0;
}
```

22. Check leap year or not

```
#include<stdio.h>
int main(){
   int year;
   scanf("%d",&year);

   printf("%s",(year%400==0)||(year%100!=0&&year%4==0)?"YES":"NO");
}

/*
Input:
2016
2017
output:
2016 is Leap year.
2017 is not Leap year.
*/
```

23. Check vowel or not

```
#include <stdio.h>
int main(){
  char ch;
  printf("Enter a character\n");
  scanf("%c", &ch);

  if (ch == 'a' || ch == 'A' || ch == 'e' || ch == 'E' || ch == 'i' || ch == 'I' || ch =='o' || ch=='O' || ch == 'u' || ch == 'U')
    printf("%c is a vowel.\n", ch);
  else
    printf("%c isn't a vowel.\n", ch);

  return 0;
}
```

24. Check perfect number or not

```
#include<stdio.h>
int main(){
 int n,i,sum=0;
 printf("Enter a number: ");
 scanf("%d",&n);
 for(i=1i<n;i++){
    if(n%i==0){
        sum=sum+i;
      }
 }
 if(sum==n)
    printf("%d is a perfect number",i);
 else
    printf("%d is not a perfect number",i);
}
```

25. Check Armstrong number or not

```
#include <stdio.h>
int main(){
   int number, originalNumber, remainder, result = 0;
   printf("Enter a three digit integer: ");
   scanf("%d", &number);
   originalNumber = number;
   while (originalNumber != 0) {
      remainder = originalNumber%10;
           originalNumber = originalNumber/ 10;

      result =result+ remainder*remainder*remainder;
   }
   if(result == number)
      printf("%d is an Armstrong number.",number);
   else
      printf("%d is not an Armstrong number.",number);

   return 0;
}
```

26. Condition operator ব্যবহার করে তিনটি সংখ্যার মধ্যে বড় সংখ্যাটি নির্নয়ের program লিখ।

```
#include<stdio.h>

int main(){

   int a,b,c;

   scanf("%d%d%d",&a,&b,&c);

   printf("Maximum=%d ",a>b&&a>c?a:b>c&&b>a?b:c);

}
```

27. Write a program to count the positive number, negative and zero from given set of numbers entered by user. ***

```
#include<stdio.h>
int main(){
        int countp=0, countn=0, countz=0, arr[100], n,i;
        scanf("%d",&n);
        for(i=1; i<=n ; i++){
                scanf("%d",&arr[i]);
        }
        for(i=1; i<=n; i++){
                if(arr[i]<0){
                        countn++;
                }
                else if(arr[i]==0){
                        countz++;
                }
                else{
                        countp++;
                }
        }
        printf("Positive Numbers = %d\n",countp);
        printf("Negative Numbers = %d\n",countn);
        printf("Zero = %d",countz);
}
```

28. Find x^y using recursive function

```
#include<stdio.h>

int power(int x,int y){

   return y==0 ? 1 :x*power(x,y-1);

}

int main(){

   int x,y,result;

   scanf("%d%d",&x,&y);

   result=power(x,y);

   printf("%d",result);

}
```

32. Solution:

(a)<stdio.h> :Standard I/O library functions

(b)<math.h> : mathematical functions

(c)<conio.h> : console input/output functions

(d)<stdlib.h> :Utility functions such as sting conversion,random number generator, memory allocation, process control, conversions and others ,etc

(e)<string.h> :String manipulation functions

(f)<ctype.h> : Character testing and conversion functions

(g)<time.h> :Time manipulation functions

33. Solution:

Element of user-defined function:

1. Function definition
2. Function call
3. Function declaration

34. Element of function definition:

i. Function name
ii. Function type
iii. List of parameters
iv. Local variable declarations
v. Function statements
vi. A return statement

35. Element of function declaration:

i. Return type
ii. Function name
iii. Parameter list
iv. Terminating semicolon

36. **Array:** Array is a *group* of elements (data). All the elements are *homogeneous* (similar). It has contiguous memory location.

Advantage:

i. Easy to traverse data
ii. Code Optimization
iii. Easy to sort data
iv. Random Access
v. Arrays can be used to implement matrices.

Disadvantage:

i. . Array is static structure. It means that array is of fixed size. The memory which is allocated to Array can not be increased or reduced
ii. Since array is of fixed size, if we allocate more memory than requirement then the memory space will be wasted
iii. Insertions and deletions are very difficult and time consuming.

37 .String:

String is an *array of characters* that is terminated by \0 (null character)

Operation of string:

i. concatenate two strings
ii. string scanning operation
iii. compare two strings
iv. copy a string
v. get string length
vi. concatenate one string with part of another
vii. compare parts of two strings
viii. copy part of a string
ix. string scanning operation

39. Error Handling During I/O Operation:

i. Reading beyond the end of file mark.
ii. Performing operations on the file that has not still been opened.
iii. Writing to a file that is opened in the read mode.
iv. Opening a file with invalid filename.
v. Device overflow.

40. ফাইল সেভ করার জন্য।

41. **the name of random access files:**

fseek(),ftell(),rewind()

42 . operation of file:

i. Creating a new file
ii. Opening an existing file
iii. Closing a file
iv. Reading from and writing information to a file

Output Program

Problem-1 :

```
#include <stdio.h>
int main()
{
   int a = 12, b = 25;
   printf(" %d \n%d ",a&b, a|b);
   return 0;
}
```

Ans:

8
29

Problem-2 :

```
#include <stdio.h>
int main
{
   int a = 12, b = 25;
   printf("Output = %d", a^b);
   return 0;
}
```

Ans:

Output = 21

Problem-3 :

```
#include <stdio.h>
int main()
{
   printf("complement = %d\n",~35);
   printf("complement = %d\n",~-12);
   return 0;
}
```

Output:

complement = -36
Output = 11

Problem-4 :

```
#include <stdio.h>
int main()
{
   int num=212, i;
   for (i=0; i<=2; ++i)
      printf("Right shift by %d: %d\n", i, num>>i);

    printf("\n");

    for (i=0; i<=2; ++i)
      printf("Left shift by %d: %d\n", i, num<<i);

    return 0;
}
```

Output:
Right Shift by 0: 212
Right Shift by 1: 106
Right Shift by 2: 53

Left Shift by 0: 212
Left Shift by 1: 424
Left Shift by 2: 848

Problem-5:

```
#include<stdio.h>
void main(){
int  p,q,x,y;
printf(“Enter the value of x \n”);
scanf(“%d” ,&x);
printf(“Enter the value of y \n”);
scanf(“%d” ,&y);
printf(“x=%d\ny=%d\n”,x,y);
p=x++;
q=y++;
printf(“x=%d\ty=%d\n”,x,y);
printf(“x=%d\tq=%d\n”,p,q);
p=--x;
q=--y;
printf(“x=%d\ty=%d\n”,x,y);
printf(“p=%d\tq=%d\n”,p,q);

}
```

Output :

```
Enter the value of x  10
Enter the value of y  20
x = 10
y = 20
x = 11    y  =  21
p = 10    q  = 20
x =  10    y  =  20
p = 10     q  =  20
```

Problem-6:

```
#include <stdio.h>

int main(){

 int x = 10,y = 20;

 printf("----INCREMENT OPERATOR EXAMPLE---- \n");

 printf("Value of x : %d \n", x);

 printf("Value of x : %d \n", x++);

 printf("Value of x : %d \n", x);

 printf("----DECREMENT OPERATOR EXAMPLE---- \n");

 printf("Value of y : %d \n", y);

 printf("Value of y : %d \n", y--);

 printf("Value of y : %d \n", y);

 return 0;

}
```

```
----INCREMENT OPERATOR EXAMPLE----
Value of x : 10
Value of x : 10
Value of x : 11
----DECREMENT OPERATOR EXAMPLE----
Value of y : 20
Value of y : 20
Value of y : 19
```