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Examination No : 286128

Subject : Programming in C/C++

Assignment.

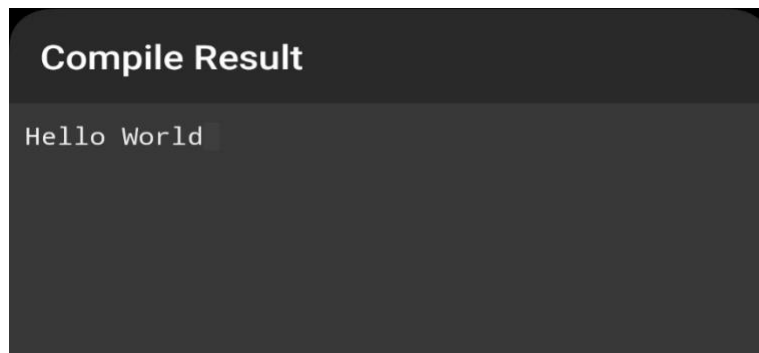
## 1) Basic Concepts:

1.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    clrscr();
    printf("Hello World");
    getch();
}
```

Output:



2.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a=5,b=6;
```

```

clrscr();
printf("Addition, %d+%d=%d",a,b,a+b);
printf("\nSubtraction%d-%d=%d",a,b,a-b);
printf("\nMultiplication, %d x %d=%d",a,b,a*b);
printf("\nDivision, %d / %d=%f",a,b,(float)a/(float)b);
printf("\nModulus, %d",a%b);
getch();
}

```

## Output:

### Compile Result

```

Addition, 5+6=11
Subtraction5-6=-1
Multiplication, 5 x 6=30
Division, 5 / 6=0.833333
Modulus, 5

```

## 3.

## Code:

```

#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
    float a,b;
    clrscr();
    printf("Enter the value of first decimal no.:");
    scanf("%f",&a);
    printf("Enter the value of second decimal no.:");

```

```
scanf("%f",&b);
printf("Addition=%.3f",a+b);
printf("\nSubtraction=%.3f",a-b);
printf("\nMultiplication=%.3f",a*b);
printf("\nDivision=%.3f",a/b);
printf("\nModulus=%.3f",fmod(a,b));
getch();
}
```

## Output:

### Compile Result

```
Enter the value of first decimal no.:3.2
Enter the value of second decimal no.:2.3
Addition=5.500
Subtraction=0.900
Multiplication=7.360
Division=1.391
Modulus=0.900
[Process completed (code 10) - press Enter]
```

## 4.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    float amount;
    int rupee, paise;
    clrscr();
    printf("Enter Amount in decimal:");
    scanf("%f",&amount);
```

```
rupee=(int)amount;
paise=(amount-rupee)*100;
printf("The amount is %d rupees and %d paise.",rupee,paise);
getch();
}
```

### Output:

#### Compile Result

```
Enter Amount in decimal:13.6
The amount is 13 rupees and 60 paise.
[Process completed (code 10) - press Enter]
```

5.

### Code:

### Output:

6.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
```

```

{
    int days,months,daysR;
    clrscr();
    printf("Enter No. of days:");
    scanf("%d",& days);
    months=days/30;
    daysR=days %30;
    printf("The Output is %d Months and %d Days.", months, daysR);
    getch();
}

```

## Output:

### Compile Result

```

Enter No. of days:45
The Output is 1 Months and 15 Days.
[Process completed (code 10) - press Enter]

```

## 7(a).

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    float Celsius, Fahrenheit;
    clrscr();
    printf("Enter Temperature in Celsius:");
    scanf("%f",& Celsius);

```

```
Fahrenheit=1.8*Celsius+32;
printf("The Temperature Conversion in Fahrenheit is %.2f °F",
Fahrenheit);
getch();
}
```

## Output:

### Compile Result

```
Enter Temperature in Celsius:37.8
The Temperature Conversion in Fahrenheit is 100.04 °F
[Process completed (code 10) - press Enter]
```

## 7(b).

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    float Celsius, Fahrenheit;
    clrscr();
    printf("Enter Temperature in Fahrenheit:");
    scanf("%f",& Fahrenheit);
    Celsius=(Fahrenheit-32)/1.8;
    printf("The Temperature Conversion in Celsius is %.2f °C", Celsius);
    getch();
}
```

## Output:

### Compile Result

```
Enter Temperature in Fahrenheit:98.5  
The Temperature Conversion in Celsius is 36.94 °C  
[Process completed (code 10) - press Enter]
```

## 8.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    short z;  
    int x, y;  
    clrscr();  
    printf("Enter value of x and y(6 digit):");  
    scanf("%d%d",&x,&y);  
    z=x+y;  
    printf("The Value of z is %d",z);  
    getch();  
}
```

## Output:



## Compile Result

```
Enter value of x and y(6 digit):537477  
758837  
The Value of z is -14406  
[Process completed (code 10) - press Enter]
```

9.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    short num = 1;  
    int i;  
    clrscr();  
    for (i = 0; i < 16; i++)  
    {  
        printf("%hd\n", num);  
        num *= 2;  
    }  
  
    getch();  
}
```

### Output:

## Compile Result

```
1
2
4
8
16
32
64
128
256
512
1024
2048
4096
8192
16384
-32768
```

10(a).

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int x, y, z;
    clrscr();
    printf("Enter No. (1):");
    scanf("%d",&x);
    printf("Enter No. (2):");
    scanf("%d",&y);
    printf("Before Swaping:\n");
    printf("%d\n",x);
    printf("%d",y);
    z=x;
    x=y;
```

```
    y=z;
    printf("After Swaping:\n");
    printf("%d\n",x);
    printf("%d\n",y);
    getch();
}
```

## Output:

### Compile Result

```
Enter No. (1):45
Enter No. (2):98
Before Swaping:
45
98
After Swaping:
98
45

[Process completed (code 10) - press Enter]
```

## 10(b).

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int x, y;
    clrscr();
    printf("Enter No. (1):");
    scanf("%d",&x);
    printf("Enter No. (2):");
```

```

scanf("%d",&y);
printf("\nBefore Swaping:\n");
printf("%d\n",x);
printf("%d",y);
x=x+y;
y=x-y;
x=x-y;
printf("\nAfter Swaping:\n");
printf("%d\n",x);
printf("%d\n",y);
getch();
}

```

## Output:

Compile Result

```

Enter No. (1):67
Enter No. (2):89

Before Swaping:
67
89
After Swaping:
89
67

[Process completed (code 10) - press Enter]

```

## 11.

## Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{

```

```
int a;  
float b;  
char c;  
double d;  
short e;  
long f;  
clrscr();  
printf("The size of Integer Data Type is %d\n",sizeof(a));  
printf("The size of Floating Data Type is %d\n",sizeof(b));  
printf("The size of Character Data Type is %d\n",sizeof(c));  
printf("The size of Double Data Type is %d\n",sizeof(d));  
printf("The size of Short Data Type is %d\n",sizeof(e));  
printf("The size of Long Data Type is %d\n",sizeof(f));  
getch();  
}
```

## Output:

### Compile Result

```
The size of Integer Data Type is 4  
The size of Floating Data Type is 4  
The size of Character Data Type is 1  
The size of Double Data Type is 8  
The size of Short Data Type is 2  
The size of Long Data Type is 8
```

## 12.

### Code:

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

```
enum Direction
{
    NORTH = 1,
    EAST,
    SOUTH,
    WEST
};

void main()
{
    enum Direction dir = EAST;
    clrscr();
    printf("The current direction is %d\n", dir);
    dir = WEST;
    printf("The current direction is now %d\n", dir);
    getch();
}
```

### Output:

#### Compile Result

```
The current direction is 2
The current direction is now 4
```

### 13.

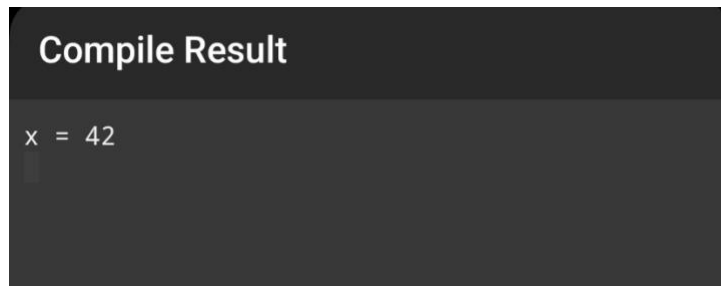
#### Code:

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

```
typedef unsigned int uint;
```

```
void main()
{
    uint x = 42;
    clrscr();
    printf("x = %u\n", x);
    getch();
}
```

### Output:



## 14.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    float a,b,c,x;
    fflush(stdin);
    clrscr();
    printf("Enter the value of a:\n");
    scanf("%f",&a);
    printf("Enter the value of b:\n");
    scanf("%f",&b);
    printf("Enter the value of c:\n");
```

```

scanf("%f",&c);
printf("Enter the value of x:\n");
scanf("%f",&x);
printf("a. = %f\n",a-b/3+c*2-1);
printf("b. = %f\n",a-b/(3+c)*(2-1));
printf("c. = %f\n",a-(b/(3+c)*2)-1);
printf("d. = %f\n", 3*a*a + 2*a + 1);
printf("e. = %f\n",2*x*x/a+9*x/8+1);
printf("f. = %f",a*a+263*b/296+8*b*b+963*a/296);
getch();
}

```

## Output:

### Compile Result

```

Enter the value of a:
3
Enter the value of b:
4
Enter the value of c:
5
Enter the value of x:
3
a. = 10.666667
b. = 2.500000
c. = 1.000000
d. = 34.000000
e. = 10.375000
f. = 150.314178
[Process completed (code 10) - press Enter]

```

## 15.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    float radius,volume;

```



```

clrscr();
printf("Enter Value of Radius of sphere(cm):");
scanf("%f",&radius);
volume= 1.34*3.14*radius*radius*radius;
printf("The Volume of Sphere of Radius %.2f cm is %.2f cm
cube.",radius,volume);
getch();
}

```

## Output:

### Compile Result

```

Enter Value of Radius of sphere(cm):4
The Volume of Sphere of Radius 4.00 cm is 269.29 cm cube.
[Process completed (code 10) - press Enter]

```

## 16.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int a;
    clrscr();
    printf("Enter Number:");
    scanf("%d",&a);
    printf("%d is Multiplication by 2.\n",a<<1);
    printf("%d is Division by 2.",a>>1);
    getch();
}

```

## Output:

### Compile Result

```
Enter Number:46
92 is Multiplication by 2.
23 is Division by 2.
[Process completed (code 10) - press Enter]
```

---

## 2) Operators And Expressions.

### 1.

#### Code:

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

void main()
{
    int x,y,z,num,s;
    clrscr();
    printf("Enter any 3 digit number:");
```

```

scanf("%d",&num);
x=num/100;
y=(num/10)%10;
z=num%10;
s=x+y+z;
printf("First Digit  : %d\n",x);
printf("Second Digit : %d\n",y);
printf("Third Digit  : %d\n",z);
printf("Sum of three digits is %d",s);
getch();
}

```

## Output:

### Compile Result

```

Enter any 3 digit number:123
First Digit  : 1
Second Digit : 2
Third Digit  : 3
Sum of three digits is 6
[Process completed (code 10) - press Enter]

```

## 2.

## Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int days,months,daysR;
    clrscr();
    printf("Enter No. of days:");

```

```

scanf("%d",& days);
months=days/30;
daysR=days %30;
printf("The Output is %d Months and %d Days.", months, daysR);
getch();
}

```

## Output:

### Compile Result

```

Enter No. of days:96
The Output is 3 Months and 6 Days.
[Process completed (code 10) - press Enter]

```

## 3.

## Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int a,b,max;
    clrscr();
    printf("Enter Two numbers:");
    scanf("%d%d",&a,&b);
    max= (a>b)?a:b;
    printf("The maximum number among %d and %d is %d",a,b,max);
    getch();
}

```

## Output:

## Compile Result

```
Enter Two numbers:23
67
The maximum number among 23 and 67 is 67
[Process completed (code 10) - press Enter]
```

4.

## Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a,b,c,max;
    clrscr();
    printf("Enter Three numbers:");
    scanf("%d%d%d",&a,&b,&c);
    max= (a>b)?((a>c)?a:c):((b>c)?b:c);
    printf("The maximum number among %d, %d and %d is %d",a,b,c,max);
    getch();
}
```

## Output:

### Compile Result

```
Enter Three numbers:12
16
17
The maximum number among 12, 16 and 17 is 17
[Process completed (code 10) - press Enter]
```

## 5.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a;
    float b;
    char c;
    double d;

    long e;
    clrscr();
    printf("The size of Integer Data Type is:   %d\n",sizeof(a));
    printf("The size of Floating Data Type is:  %d\n",sizeof(b));
    printf("The size of Character Data Type is: %d\n",sizeof(c));
    printf("The size of Double Data Type is:    %d\n",sizeof(d));

    printf("The size of Long Data Type is:      %d\n",sizeof(e));
    getch();
}
```

### Output:

#### Compile Result

```
The size of Integer Data Type is:   4
The size of Floating Data Type is:  4
The size of Character Data Type is:  1
The size of Double Data Type is:     8
The size of Long Data Type is:       8
```

## 6.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int x=7, y=9;
    clrscr();
    printf("a) Z = %d\n",x++ + ++y - x-- + --y);
    x=5;
    y=2;
    printf("b) Z = %d\n",x++ * y++ / ++x - --y % x++);
    getch();
}
```

### Output:

#### Compile Result

```
a) Z = 18
b) Z = -1
```

---

### 3) Decision Making & Branching (Control Structures)

1(a).

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a;
    clrscr();
    printf("Enter any number:");
    scanf("%d",&a);
    if(a%2==0)
    {
        printf("%d is a Even Number.",a);
    }
    else
    {
        printf("%d is a Odd Number.",a);
    }
    getch();
}
```



```
}
```

## Output:

### Compile Result

```
Enter any number:34
34 is a Even Number.
[Process completed (code 10) - press Enter]
```

## 1(b).

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int year;
    clrscr();
    printf("Enter Year:");
    scanf("%d",&year);
    if(year%4==0)
    {
        printf("%d is a Leap Year",year);
    }
    else
    {
        printf("%d is not a Leap Year",year);
    }
    getch();
}
```

## Output:

### Compile Result

```
Enter Year:2024
2024 is a Leap Year
[Process completed (code 10) - press Enter]
```

## 1(c).

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int age;
    clrscr();
    printf("Enter Age:");
    scanf("%d",&age);
    if(age>=18)
    {
        printf("You are elligible to vote.");
    }
    else
    {
        printf("You are not elligible to vote.");
    }
    getch();
}
```

## Output:

### Compile Result

```
Enter Age:15
You are not elligible to vote.
[Process completed (code 10) - press Enter]
```

## 2.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a;
    clrscr();
    printf("Enter any number:");
    scanf("%d",&a);
    if(a>0)
    {
        printf("The number is Positive.");
    }
    else if(a<0)
    {
        printf("The number is Negative.");
    }
    else if(a==0)
    {
        printf("It is equal to ZERO!!");
    }
}
```

```
    }  
    else  
    {  
        printf("Invalid Choice!!!");  
    }  
    getch();  
}
```

### Output:

#### Compile Result

```
Enter any number:-34  
The number is Negative.  
[Process completed (code 10) - press Enter]
```

### 3.

#### Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    char ch;  
  
    // read a character from the user  
    printf("Enter a character: ");  
    scanf("%c", &ch);
```

```

// print the ASCII value of the character
printf("ASCII value of %c is %d\n", ch, ch);

// check if the character is uppercase and convert to lowercase
if (ch >= 'A' && ch <= 'Z')
{
    ch += 32; // ASCII value difference between uppercase and
lowercase
    printf("Lowercase of %c is %c\n", ch-32, ch);
}
// check if the character is lowercase and convert to uppercase
else if (ch >= 'a' && ch <= 'z')
{
    ch -= 32; // ASCII value difference between lowercase and
uppercase
    printf("Uppercase of %c is %c\n", ch+32, ch);
}

// check if the character is a vowel or not
switch (ch)
{
    case 'a':
    case 'e':
    case 'i':
    case 'o':
    case 'u':
        printf("%c is a vowel.\n", ch);
        break;
    case 'A':
    case 'E':
    case 'I':
    case 'O':
    case 'U':
        printf("%c is a vowel.\n", ch);
        break;
}

```

```

        default:
            printf("%c is not a vowel.\n", ch);
    }

    getch();
}

```

## Output:

### Compile Result

```

Enter a character: Z
ASCII value of Z is 90
Lowercase of Z is z
z is not a vowel.

[Process completed (code 10) - press Enter]

```

## 4.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    char ch;
    clrscr();
    // read a character from the user
    printf("Enter a character: ");
    scanf("%c", &ch);

    // check if the character is a number

```

```

if (ch >= '0' && ch <= '9')
{
    printf("It is a number.\n");
}
// check if the character is an alphabet
else if ((ch >= 'a' && ch <= 'z') || (ch >= 'A' && ch <= 'Z'))
{
    printf("%c is an alphabet. ", ch);
    // check if the alphabet is uppercase or lowercase
    if (ch >= 'a' && ch <= 'z')
    {
        printf("It is a lowercase alphabet. ");
        // check if the alphabet is a vowel
        if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
ch=='u')
        {
            printf("It is a vowel.\n");
        }
        else
        {
            printf("It is not a vowel.\n");
        }
    }
    else
    {
        printf("It is an uppercase alphabet.\n");
        if (ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch ==
'U')
        {
            printf("It is a vowel.\n");
        }
        else
        {
            printf("It is not a vowel.\n");
        }
    }
}

```

```

    }
}
// check if the character is a special character
else
{
    printf("%c is a special character.\n", ch);
}

getch();
}

```

## Output:

### Compile Result

```

Enter a character: @
@ is a special character.

[Process completed (code 10) - press Enter]

```

## 5.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int a,b,c;
    float avg;
    clrscr();
    printf("Enter value of any three numbers:");
    scanf("%d%d%d",&a,&b,&c);
}

```



```
avg=(a+b+c)/3;
printf("Average is %.1f.\n",avg);
if(a>b)
{
    if(a<c)
    {
        printf("%d is maximum\n",c);
    }
    else
    {
        printf("%d is maximum\n",a);
    }
}
if(b>a)
{
    if(b<c)
    {
        printf("%d is maximum\n",c);
    }
    else
    {
        printf("%d is maximum\n",b);
    }
}
if(a<b)
{
    if(a>c)
    {
        printf("%d is minimum",c);
    }
    else
    {
        printf("%d is minimum",a);
    }
}
```

```

    }
    if(b<a)
    {
        if(b>c)
        {
            printf("%d is minimum",c);
        }
        else
        {
            printf("%d is minimum",b);
        }
    }
    getch();
}

```

## Output:

### Compile Result

```

Enter value of any three numbers:34
67
90
Average is 63.0.
90 is maximum
34 is minimum
[Process completed (code 10) - press Enter]

```

## 6.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{

```

```

int a,b,c,d,num,deno;
clrscr();
printf("Enter values of a,b,c,d:");
scanf("%d%d%d%d",&a,&b,&c,&d);
printf("Substituting the values in eqn of ratio:  (a+b)/(c-d)\n");
num=a+b;
deno=c-d;
if(deno==0)
{
    printf("Ratio cannot be calculated since (c-d)=0.");
}
else
{
    printf("The Ratio is : %d",num/deno);
}
getch();
}

```

## Output:

### Compile Result

```

Enter values of a,b,c,d:3
4
5
6
Substituting the values in eqn of ratio:  (a+b)/(c-d)
The Ratio is : -7
[Process completed (code 10) - press Enter]

```

## 7.

### Code:

```

#include<stdio.h>
#include<conio.h>

```

```

void main()
{
    int a,b,ch1,ch;
    clrscr();
    printf("This is a calculator ;)\n");
    printf("Please select the way to calculate:\n");
    printf("Enter 1 to calculate with if-else syntax.\n");
    printf("Enter 2 to calculate with switch-case syntax.\n");
    scanf("%d",&ch1);
    if(ch1==1)
    {
        printf("Enter 1 to Add two numbers:\n");
        printf("Enter 2 to Subtract two numbers:\n");
        printf("Enter 3 to Multiply two numbers:\n");
        printf("Enter 4 to Divide two numbers:\n");
        printf("Enter 5 to get Remainder of two numbers:\n");
        scanf("%d",&ch);
        if(ch==1)
        {
            printf("Enter Two Numbers:");
            scanf("%d%d",&a,&b);
            printf("The Addition is %d + %d = %d",a,b,a+b);
        }
        else if(ch==2)
        {
            printf("Enter Two Numbers:");
            scanf("%d%d",&a,&b);
            printf("The Subtraction is %d - %d = %d",a,b,a-b);
        }
        else if(ch==3)
        {
            printf("Enter Two Numbers:");
            scanf("%d%d",&a,&b);
            printf("The Multiplication is %d x %d = %d",a,b,a*b);
        }
    }
}

```

```

    }
    else if(ch==4)
    {
        printf("Enter Two Numbers:");
        scanf("%d%d",&a,&b);
        printf("The Division is %d / %d = %d",a,b,a/b);
    }
    else if(ch==5)
    {
        printf("Enter Two Numbers:");
        scanf("%d%d",&a,&b);
        printf("The Remainder is %d",a%b);
    }
    else
    {
        printf("Invalid Choice!!");
    }
}
else
{
    printf("Enter 1 to Add two numbers:\n");
    printf("Enter 2 to Subtract two numbers:\n");
    printf("Enter 3 to Multiply two numbers:\n");
    printf("Enter 4 to Divide two numbers:\n");
    printf("Enter 5 to get Remainder of two numbers:\n");
    scanf("%d",&ch);
    switch(ch)
    {
        case 1:
        {
            printf("Enter Two Numbers:");
            scanf("%d%d",&a,&b);
            printf("The Addition is %d + %d = %d",a,b,a+b);
            break;

```

```

    }
    case 2:
    {
        printf("Enter Two Numbers:");
        scanf("%d%d",&a,&b);
        printf("The Subtraction is %d - %d = %d",a,b,a-b);
        break;
    }
    case 3:
    {
        printf("Enter Two Numbers:");
        scanf("%d%d",&a,&b);
        printf("The Multiplication is %d x %d = 
%d",a,b,a*b);
        break;
    }
    case 4:
    {
        printf("Enter Two Numbers:");
        scanf("%d%d",&a,&b);
        printf("The Division is %d / %d = %d",a,b,a/b);
        break;
    }
    case 5:
    {
        printf("Enter Two Numbers:");
        scanf("%d%d",&a,&b);
        printf("The Remainder is %d % %d = %d",a,b,a%b);
        break;
    }
    default:
    {
        printf("Invalid Choice!!");
    }

```

```
        }  
    }  
    getch();  
}
```

## Output:

### Compile Result

```
This is a calculator ;)
Please select the way to calculate:
Enter 1 to calculate with if-else syntax.
Enter 2 to calculate with switch-case syntax.
2
Enter 1 to Add two numbers:
Enter 2 to Subtract two numbers:
Enter 3 to Multiply two numbers:
Enter 4 to Divide two numbers:
Enter 5 to get Remainder of two numbers:
3
Enter Two Numbers:24 56
The Multiplication is 24 x 56 = 1344
[Process completed (code 10) - press Enter]
```

## 8.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
```

```
int sub1, sub2, sub3, sub4;
float total, aggregate;

// Get marks in four subjects from user
printf("Enter marks in four subjects:\n");
scanf("%d%d%d%d", &sub1, &sub2, &sub3, &sub4);

// Calculate total marks and aggregate percentage
total = sub1 + sub2 + sub3 + sub4;
aggregate = total / 4.0;

// Display the total and aggregate
printf("Total marks: %.2f\n", total);
printf("Aggregate percentage: %.2f%%\n", aggregate);

// Display the grade obtained using if-else ladder
if (aggregate >= 80)
{
    printf("Grade: Outstanding\n");
}
else if (aggregate >= 70 && aggregate < 80)
{
    printf("Grade: A+\n");
}
else if (aggregate >= 60 && aggregate < 70)
{
    printf("Grade: A\n");
}
else if (aggregate >= 50 && aggregate < 60)
{
    printf("Grade: B+\n");
}
else if (aggregate >= 40 && aggregate < 50)
{
```



```

        printf("Grade: B\n");
    }
    else
    {
        printf("Fail;\n");
    }

// Display the grade obtained using switch case
switch ((int)aggregate / 10)
{
    case 10:
    case 9:
    case 8:
        printf("Grade: Outstanding\n");
        break;
    case 7:
        printf("Grade: A+\n");
        break;
    case 6:
        printf("Grade: A\n");
        break;
    case 5:
        printf("Grade: B+\n");
        break;
    case 4:
        printf("Grade: B\n");
        break;
    default:
        printf("Grade: Fail\n");
        break;
}

getch();
}

```

## Output:

### Compile Result

```
Enter marks in four subjects:
23 56 78 98
Total marks: 255.00
Aggregate percentage: 63.75%
Grade: A
Grade: A

[Process completed (code 10) - press Enter]
```

## 9.

### Code:

```
#include<stdio.h>
#include<conio.h>
#include<math.h>

void main()
{
    float a, b, c, D, root1, root2;
    clrscr();
    printf("Enter coefficients a, b and c: ");
    scanf("%f %f %f", &a, &b, &c);

    D = b*b - 4*a*c;

    if (D > 0)
    {
        root1 = (-b + sqrt(D)) / (2*a);
```

```

        root2 = (-b - sqrt(D)) / (2*a);
        printf("Roots are real and different.\n");
        printf("Root 1 = %.2f\n", root1);
        printf("Root 2 = %.2f\n", root2);
    }
    else if (D == 0)
    {
        root1 = root2 = -b / (2*a);
        printf("Roots are real and same.\n");
        printf("Root 1 = Root 2 = %.2f\n", root1);
    }
    else
    {
        float realPart = -b / (2*a);
        float imaginaryPart = sqrt(-D) / (2*a);
        printf("Roots are complex and different.\n");
        printf("Root 1 = %.2f+%.2fi\n", realPart, imaginaryPart);
        printf("Root 2 = %.2f-%.2fi\n", realPart, imaginaryPart);
    }

    getch();
}

```

## Output:

### Compile Result

```

Enter coefficients a, b and c: 2 4 6
Roots are complex and different.
Root 1 = -1.00+1.41i
Root 2 = -1.00-1.41i

```

```
[Process completed (code 10) - press Enter]
```

## 10.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int units;
    float bill_amount, meter_charge = 100.00;
    clrscr();
    printf("Enter the number of units consumed: ");
    scanf("%d", &units);

    if (units <= 200)
    {
        bill_amount = units * 0.80;
    }
    else if (units <= 300)
    {
        bill_amount = 200 * 0.80 + (units - 200) * 0.90;
    }
    else
    {
        bill_amount = 200 * 0.80 + 100 * 0.90 + (units - 300) * 1.00;
    }

    if (bill_amount > 400.00)
    {
        bill_amount += meter_charge;
        bill_amount += bill_amount * 0.15;
    }
}
```

```

    }

    printf("Electricity bill: Rs. %.2f\n", bill_amount);

    getch();
}

```

## Output:

### Compile Result

```

Enter the number of units consumed: 456
Electricity bill: Rs. 581.90

[Process completed (code 10) - press Enter]

```

## 11.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    float salary, bonus;
    char gender;
    clrscr();
    printf("Enter the salary: ");
    scanf("%f", &salary);

    printf("Enter the gender (M/F): ");
    scanf(" %c", &gender);

    bonus = (gender == 'M') ? salary * 0.05 : salary * 0.10;
}

```

```

if(salary<10000)
{
    bonus+=salary*0.02;
    salary+=bonus;
    printf("Bonus : Rs. %.2f\n",bonus);
    printf("Salary: Rs. %.2f", salary);
}
else
{
    salary += bonus;
    printf("Bonus : Rs. %.2f\n",bonus);
    printf("Salary: Rs. %.2f", salary);
}
getch();
}

```

## Output:

### Compile Result

```

Enter the salary: 25000
Enter the gender (M/F): F
Bonus : Rs. 2500.00
Salary: Rs. 27500.00
[Process completed (code 10) - press Enter]

```

## 12.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{

```

```

int x, y, z, temp;
clrscr();
printf("Enter the values of x, y, and z: ");
scanf("%d %d %d", &x, &y, &z);
printf("Before rotation: \nx = %d \ny = %d, \nz = %d\n", x, y, z);

temp = x;    // Store the value of x in a temporary variable
x = y;       // Assign the value of y to x
y = z;       // Assign the value of z to y
z = temp;    // Assign the value of the temporary variable to z

printf("After rotation: \nx = %d\nny = %d\nnz = %d\n", x, y, z);
getch();
}

```

## Output:

### Compile Result

```

Enter the values of x, y, and z: 2 3 7
Before rotation:
x = 2
y = 3,
z = 7
After rotation:
x = 3
y = 7
z = 2

[Process completed (code 10) - press Enter]

```

## 13.

### Code:

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

```
#include<conio.h>
#include<math.h>

void main()
{
    float price;
    int rupees, paisa;
    clrscr();
    printf("Enter the price of the item in decimal form: ");
    scanf("%f", &price);

    rupees = (int) price; // Type cast the price to an integer to get the rupees
    paisa = round((price - rupees) * 100); // Subtract the rupees to get paisa, and round off to the nearest integer

    printf("%d rupees and %d paisa\n", rupees, paisa);
    getch();
}
```

### Output:

#### Compile Result

```
Enter the price of the item in decimal form:
231.8
231 rupees and 80 paisa

[Process completed (code 10) - press Enter]
```

### 14.

#### Code:



```
#include<stdio.h>
#include<conio.h>
void main()
{
    int marks[5];
    int i, passCount = 0, failCount = 0;
    for (i = 0; i < 5; i++)
    {
        printf("Enter the marks for subject %d: ", i+1);
        scanf("%d", &marks[i]);
        if (marks[i] >= 40)
        {
            passCount++;
        }
        else
        {
            failCount++;
        }
    }

    if (passCount == 5)
    {
        printf("PASS\n");
    }
    else if (failCount <= 2)
    {
        printf("ATKT\n");
    }
    else
    {
        printf("FAIL\n");
    }
    getch();
}
```

## Output:

### Compile Result

```
Enter the marks for subject 1: 49
Enter the marks for subject 2: 23
Enter the marks for subject 3: 67
Enter the marks for subject 4: 12
Enter the marks for subject 5: 78
ATKT

[Process completed (code 10) - press Enter]
```

## 15(a).

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int choice;
    float radius, base, height, length, width, area;
    printf("Enter: \n1 for circle\n2 for triangle  \n3 for rectangle ");
    scanf("%d", &choice);

    switch(choice)
    {
        case 1:
            printf("Enter the radius of the circle: ");
            scanf("%f", &radius);
```

```

        area = 3.14 * radius * radius;
        printf("The area of the circle is %.2f\n", area);
        break;
    case 2:
        printf("Enter the base and height of the triangle: ");
        scanf("%f %f", &base, &height);
        area = 0.5 * base * height;
        printf("The area of the triangle is %.2f\n", area);
        break;
    case 3:
        printf("Enter the length and width of the rectangle: ");
        scanf("%f %f", &length, &width);
        area = length * width;
        printf("The area of the rectangle is %.2f\n", area);
        break;
    default:
        printf("Invalid choice\n");
}

getch();
}

```

## Output:

### Compile Result

```

Enter:
1 for circle
2 for triangle
3 for rectangle 3
Enter the length and width of the rectangle:
12 14
The area of the rectangle is 168.00

[Process completed (code 10) - press Enter]

```

## 15(b).

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int num, remainder;
    clrscr();
    printf("Enter a number: ");
    scanf("%d", &num);

    remainder = num % 2;

    switch(remainder)
    {
        case 0:
            printf("%d is even\n", num);
            break;
        case 1:
        case -1:
            printf("%d is odd\n", num);
            break;
        default:
            printf("Invalid number\n");
    }

    getch();
}
```

### Output:

## Compile Result

```
Enter a number: 45  
45 is odd
```

```
[Process completed (code 10) - press Enter]
```

---

## 4) Looping Structures

1.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, sum = 0, i = 1;
    clrscr();

    // Using while loop
    printf("Enter the value of n: ");
    scanf("%d", &n);
    while (i <= n)
    {
        sum += i;
        i++;
    }
    printf("The sum of the first %d natural numbers (using while loop) is:
%d\n", n, sum);

    // Using for loop
    sum = 0; // Reset sum to zero
    for (i = 1; i <= n; i++)
    {
        sum += i;
    }
    printf("The sum of the first %d natural numbers (using for loop) is:
%d\n", n, sum);
```

```

// Using goto statement
sum = 0; // Reset sum to zero
i = 1; // Reset i to 1
start:
    sum += i;
    i++;
    if (i <= n)
    {
        goto start;
    }
    printf("The sum of the first %d natural numbers (using goto statement)
is: %d\n", n, sum);

    getch();
}

```

## Output:

### Compile Result

```

Enter the value of n: 19
The sum of the first 19 natural numbers (using while loop) is: 190
The sum of the first 19 natural numbers (using for loop) is: 190
The sum of the first 19 natural numbers (using goto statement) is: 190

[Process completed (code 10) - press Enter]

```

## 2.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()

```

```

{
    int num, pos_count = 0, neg_count = 0, pos_sum = 0, neg_sum = 0;
    float pos_avg, neg_mean;
    char choice;
    clrscr();

    // Using goto statement
start:
    printf("Enter a number (enter -1 to stop): ");
    scanf("%d", &num);
    if (num == -1)
    {
        goto end;
    }
    if (num >= 0)
    {
        pos_sum += num;
        pos_count++;
    }
    else
    {
        neg_sum += num;
        neg_count++;
    }
    goto start;

end:
    if (pos_count > 0)
    {
        pos_avg = (float) pos_sum / pos_count;
        printf("Sum of positive numbers: %d\n", pos_sum);
        printf("Average of positive numbers: %.2f\n", pos_avg);
    }
    else

```



```
{
    printf("No positive numbers were entered.\n");
}
if (neg_count > 0)
{
    neg_mean = (float) neg_sum / neg_count;
    printf("Sum of negative numbers: %d\n", neg_sum);
    printf("Mean of negative numbers: %.2f\n", neg_mean);
}
else
{
    printf("No negative numbers were entered.\n");
}

// Using do while loop
pos_count = 0;
neg_count = 0;
pos_sum = 0;
neg_sum = 0;
do
{
    printf("Enter a number (enter -1 to stop): ");
    scanf("%d", &num);
    if (num >= 0)
    {
        pos_sum += num;
        pos_count++;
    }
    else if (num < 0 && num != -1)
    {
        neg_sum += num;
        neg_count++;
    }
} while (num != -1);
```

```

if (pos_count > 0)
{
    pos_avg = (float) pos_sum / pos_count;
    printf("Sum of positive numbers: %d\n", pos_sum);
    printf("Average of positive numbers: %.2f\n", pos_avg);
}
else
{
    printf("No positive numbers were entered.\n");
}
if (neg_count > 0)
{
    neg_mean = (float) neg_sum / neg_count;
    printf("Sum of negative numbers: %d\n", neg_sum);
    printf("Mean of negative numbers: %.2f\n", neg_mean);
}
else
{
    printf("No negative numbers were entered.\n");
}

getch();
}

```

## Output:

### Compile Result

```

Enter a number (enter -1 to stop): 2
Enter a number (enter -1 to stop): 4
Enter a number (enter -1 to stop): 5
Enter a number (enter -1 to stop): 2
Enter a number (enter -1 to stop): -1
Sum of positive numbers: 13
Average of positive numbers: 3.25
No negative numbers were entered.
Enter a number (enter -1 to stop): █

```

### 3.

#### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int x, n, i;
    long long y = 1;
    clrscr();

    printf("Enter the value of x: ");
    scanf("%d", &x);
    printf("Enter the value of n: ");
    scanf("%d", &n);

    for (i = 1; i <= n; i++)
    {
        y *= x;
    }

    printf("%d raised to %d is %lld\n", x, n, y);

    getch();
}
```

#### Output:

## Compile Result

```
Enter the value of x: 2
Enter the value of n: 3
2 raised to 3 is 8
```

```
[Process completed (code 10) - press Enter]
```

4.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n=18,i,c;
    int a=0;
    int b=1;
    clrscr();

    printf("Fibonacci Series(for 20 terms):\n");
    printf("%d %d",a,b);
    for(i=0;i<n;i++)
    {
        c=a+b;
        a=b;
        b=c;
        printf(" %d",c);
    }
    getch();
}
```

## Output:

### Compile Result

```
Fibonacci Series(for 20 terms):  
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181
```

## 5.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    int start, end, i, even_sum = 0, odd_sum = 0;  
    clrscr();  
  
    printf("Enter the starting number: ");  
    scanf("%d", &start);  
  
    printf("Enter the ending number: ");  
    scanf("%d", &end);  
  
    for (i = start; i <= end; i++)  
    {  
        if (i % 2 == 0)  
        {  
            even_sum += i;  
        }  
        else
```

```

        {
            odd_sum += i;
        }
    }

    printf("Sum of even numbers between %d and %d is %d\n", start, end,
even_sum);
    printf("Sum of odd numbers between %d and %d is %d\n", start, end,
odd_sum);

    getch();
}

```

## Output:

### Compile Result

```

Enter the starting number: 12
Enter the ending number: 90
Sum of even numbers between 12 and 90 is 2040
Sum of odd numbers between 12 and 90 is 1989

[Process completed (code 10) - press Enter]

```

## 6.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int num, digit, rev = 0;

    char* words[] = {"ZERO", "ONE", "TWO", "THREE", "FOUR", "FIVE", "SIX",
"SEVEN", "EIGHT", "NINE"};

```

```
clrscr();

printf("Enter a number: ");
scanf("%d", &num);

printf("Number in words: ");

// Reverse the number
while (num > 0)
{
    digit = num % 10;
    rev = rev * 10 + digit;
    num /= 10;
}

// Convert each digit to word
while (rev > 0)
{
    digit = rev % 10;
    printf("%s ", words[digit]);
    rev /= 10;
}

getch();
}
```

**Output:**

## Compile Result

```
Enter a number: 286128
Number in words: TWO EIGHT SIX ONE TWO EIGHT
[Process completed (code 10) - press Enter]
```

7.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i = 1, num, largest = -999999;
    clrscr();

    while (i <= 10)
    {
        printf("Enter number %d: ", i);
        scanf("%d", &num);

        if (num > largest)
        {
            largest = num;
        }

        i++;
    }

    printf("The largest number is(while loop) %d\n", largest);
```



```
i = 1;
largest = -999999;

loop:
    printf("Enter number %d: ", i);
    scanf("%d", &num);

    if (num > largest)
    {
        largest = num;
    }

    i++;

    if (i <= 10)
    {
        goto loop;
    }

    printf("The largest number is(by goto) %d\n", largest);
    getch();
}
```

**Output:**

## Compile Result

```
Enter number 1: 847
Enter number 2: 2774
Enter number 3: 2994
Enter number 4: 7374
Enter number 5: 22
Enter number 6: 582
Enter number 7: 439
Enter number 8: 588
Enter number 9: 38
Enter number 10: 5939
The largest number is(while loop) 7374
Enter number 1: 847
Enter number 2: 2774
Enter number 3: 2994
Enter number 4: 2994
Enter number 5: 7374
Enter number 6: 22
Enter number 7: 582
Enter number 8: 588
Enter number 9: 38
Enter number 10: 5939
The largest number is(by goto) 7374

[Process completed (code 10) - press Enter]
```

8.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int num, rev = 0, sum = 0, rem;
    clrscr();

    printf("Enter a number: ");
    scanf("%d", &num);

    while (num != 0)
    {
```

```

        rem = num % 10;
        rev = rev * 10 + rem;
        sum += rem;
        num /= 10;
    }

    printf("The reverse of the number is: %d\n", rev);
    printf("The sum of its digits is: %d\n", sum);

    getch();
}

```

## Output:

### Compile Result

```

Enter a number: 43
The reverse of the number is: 34
The sum of its digits is: 7

[Process completed (code 10) - press Enter]

```

## 9.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int n, i;
    unsigned long long fact = 1;

```

```
printf("Enter an integer: ");
scanf("%d", &n);

// Error check: Factorial is defined only for non-negative integers.
if (n < 0)
{
    printf("Error: Factorial is not defined for negative numbers.");
}

// Calculate the factorial of the number.
for (i = 1; i <= n; ++i)
{
    fact *= i;
}

printf("Factorial of %d = %llu", n, fact);
getch();
}
```

### Output:

#### Compile Result

```
Enter an integer: 6
Factorial of 6 = 720
[Process completed (code 10) - press Enter]
```

### 10.

#### Code:

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

```
void main()
{
    int n, i,j;
    float sum = 0;
    clrscr();

    printf("Enter a value for n: ");
    scanf("%d", &n);

    // Calculate the sum of the series.
    for (i = 1; i <= n; ++i)
    {
        sum += 1.0 / i;
    }

    printf("a)The sum of the series is %f\n", sum);

    // Calculate the sum of the series.
    for (i = 1; i <= n; ++i)
    {
        sum += (float)i / (i + 1);
    }

    printf("b)Sum of the series = %f\n", sum);

    // Calculate the sum of the series.
    for (i = 1; i <= n; ++i)
    {
        sum += 1.0 / (i * i);
    }

    printf("c)Sum of the series = %lf\n", sum);
```

```

//Error check: Series is defined only for positive integers.
if (n <= 0)
{
    printf("Error: Series is not defined for non-positive numbers.");
}

// Calculate the sum of the series.
for (i = 1; i <= n; ++i)
{
    unsigned long long fact = 1;
    for (j = 1; j <= i; ++j)
    {
        fact *= j;
    }
    sum += fact;
}

printf("d)Sum of the series = %llu\n", sum);

for (i = 1; i <= n; ++i)
{
    // If i is odd, subtract it from the sum.
    if (i % 2 == 1)
    {
        sum -= i;
    }
    // If i is even, add it to the sum.
    else
    {
        sum += i;
    }
}

printf("e)The sum of the series up to %d is: %d", n, sum);

```

```
    getch();  
}
```

### Output:

#### Compile Result

```
Enter a value for n: 2  
a)The sum of the series is 1.500000  
b)Sum of the series = 2.666667  
c)Sum of the series = 3.916667  
d)Sum of the series = 3  
e)The sum of the series up to 2 is: 24  
[Process completed (code 10) - press Enter]
```

## 11.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    int low, high, i, j, is_prime;  
    clrscr();  
  
    printf("Enter the lower limit: ");  
    scanf("%d", &low);  
  
    printf("Enter the upper limit: ");  
    scanf("%d", &high);  
  
    printf("Prime numbers between %d and %d are: ", low, high);
```

```

// Traverse each number in the range
for (i = low; i <= high; ++i)
{
    // Check if the number is prime or not
    is_prime = 1;
    for (j = 2; j <= i/2; ++j)
    {
        if (i % j == 0)
        {
            is_prime = 0;
            break;
        }
    }

    // If the number is prime, print it
    if (is_prime == 1)
    {
        printf("%d ", i);
    }
}

getch();
}

```

**Output:**

## Compile Result

```

Enter the lower limit: 14
Enter the upper limit: 41
Prime numbers between 14 and 41 are: 17 19 23 29 31 37 41
[Process completed (code 10) - press Enter]

```



## 12.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int low, high, i, j, sum;
    clrscr();

    printf("Enter the lower limit: ");
    scanf("%d", &low);

    printf("Enter the upper limit: ");
    scanf("%d", &high);

    printf("Perfect numbers between %d and %d are: ", low, high);

    // Traverse each number in the range
    for (i = low; i <= high; ++i)
    {
        sum = 0;
        // Check if the number is perfect or not
        for (j = 1; j <= i/2; ++j)
        {
            if (i % j == 0)
            {
                sum += j;
            }
        }
        if (sum == i)
        {
            printf("%d ", i);
        }
    }
}
```

```
    }  
}  
  
getch();  
}
```

### Output:

## Compile Result

```
Enter the lower limit: 1  
Enter the upper limit: 1000  
Perfect numbers between 1 and 1000 are: 6 28 496  
[Process completed (code 10) - press Enter]
```

### 13.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
#include<math.h>  
  
void main()  
{  
    int low, high, num, digit, sum, temp;  
    clrscr();  
  
    printf("Enter the lower limit: ");  
    scanf("%d", &low);  
  
    printf("Enter the upper limit: ");  
    scanf("%d", &high);
```

```

printf("Armstrong numbers between %d and %d are: ", low, high);

// Traverse each number in the range
for (num = low; num <= high; num++)
{
    // Find the number of digits in the number
    temp = num;
    int n = 0;
    while (temp != 0)
    {
        n++;
        temp /= 10;
    }

    // Calculate the sum of the cubes of the digits
    temp = num;
    sum = 0;
    while (temp != 0)
    {
        digit = temp % 10;
        sum += pow(digit, n);
        temp /= 10;
    }

    // Check if the number is Armstrong or not
    if (num == sum)
    {
        printf("%d ", num);
    }
}

getch();
}

```

## Output:

### Compile Result

```
Enter the lower limit: 1
Enter the upper limit: 1000
Armstrong numbers between 1 and 1000 are: 1 2 3 4 5 6 7 8 9 153 370 371 407
[Process completed (code 10) - press Enter]
```

## 14.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int correct_number = 42;
    int input_number;
    int attempts = 0;
    clrscr();

    do{
        printf("Enter the correct number(Hint: 7*3*2): ");
        scanf("%d", &input_number);
        attempts++;
    } while (input_number != correct_number);

    printf("Congratulations! You entered the correct number in %d
attempts.\n", attempts);

    getch();
}
```

## Output:

### Compile Result

```
Enter the correct number(Hint: 7*3*2): 63
Enter the correct number(Hint: 7*3*2): 827
Enter the correct number(Hint: 7*3*2): 84
Enter the correct number(Hint: 7*3*2): 42
Congratulations! You entered the correct number in 4 attempts.

[Process completed (code 10) - press Enter]
```

## 15.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n;
    clrscr();
    printf("Enter a positive integer: ");
    scanf("%d", &n);

    for (int i = n; i >= 0; i--)
    {
        printf("%d ", i);
    }

    for (int i = 1; i <= n; i++)
    {
        printf("%d ", i);
    }

    printf("\n");
}
```

```
    getch();  
}
```

## Output:

### Compile Result

```
Enter a positive integer: 15  
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
[Process completed (code 10) - press Enter]
```

## 16.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    int number,i;  
    const char* words[] = {"zero", "one", "two", "three", "four",  
                           "five", "six", "seven", "eight", "nine", "ten"};  
    clrscr();  
  
    printf("Enter a number between 0 and 10: ");  
    scanf("%d", &number);  
  
    if (number < 0 || number > 10)  
    {  
        printf("Error: number out of range (0-10)\n");  
    }  
  
    printf("Number in words: ");
```

```

    for ( i = 0; i <= number; ++i)
    {
    }
    printf("%s ", words[i-1]);
    getch();
}

```

### Output:

## Compile Result

```

Enter a number between 0 and 10: 6
Number in words: six
[Process completed (code 10) - press Enter]

```

### 17.

### Code:

```

#include<stdio.h>
#include<conio.h>
void swap(int *x, int *y);
void permute(int *arr, int start, int end);
void main()
{
    int n;
    clrscr();
    printf("Enter the number of elements: ");
    scanf("%d", &n);
    int arr[n];
    printf("Enter the elements: ");
}

```

```

    for (int i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
    }
    permute(arr, 0, n - 1);
    getch();
}

void swap(int *x, int *y)
{
    int temp = *x;
    *x = *y;
    *y = temp;
}

void permute(int *arr, int start, int end)
{
    if (start == end)
    {
        // Base case: all elements have been swapped, print permutation
        for (int i = 0; i <= end; i++)
        {
            printf("%d ", arr[i]);
        }
        printf("\n");
    }
    else
    {
        // Recursive case: swap each element with the first element and
permute the rest
        for (int i = start; i <= end; i++)
        {
            swap(&arr[start], &arr[i]);
            permute(arr, start + 1, end);

```



```

        swap(&arr[start], &arr[i]); // backtrack by swapping again
    }
}
}

```

## Output:

### Compile Result

```

Enter the number of elements: 3
Enter the elements: 1 2 3
1 2 3
1 3 2
2 1 3
2 3 1
3 2 1
3 1 2

[Process completed (code 10) - press Enter]

```

## 18.

### Code:

```

#include<stdio.h>
#include<conio.h>
int trailingZeros(int n);

void main()
{
    int n;
    printf("Enter a number: ");
    scanf("%d", &n);
    int zeros = trailingZeros(n);
    printf("Number of trailing zeros in %d! = %d\n", n, zeros);
    getch();
}

```

```
int trailingZeros(int n)
{
    int count = 0;
    for (int i = 5; n / i >= 1; i *= 5)
    {
        count += n / i;
    }
    return count;
}
```

### Output:

#### Compile Result

```
Enter a number: 100
Number of trailing zeros in 100! = 24

[Process completed (code 10) - press Enter]
```

## 19.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int day, month, year;
    char c;
    clrscr();

    do {
        printf("Enter date in dd-mm-yyyy format: ");
        scanf("%d%d%d", &day, &month, &year);
```

```

int q = day;
int m = month;
int y = year;

if (m == 1 || m == 2)
{
    m += 12;
    y--;
}

int h = (q + 13 * (m + 1) / 5 + y + y / 4 - y / 100 + y / 400) % 7
-1;

switch (h)
{
    case 0:
        printf("Sunday\n");
        break;
    case 1:
        printf("Monday\n");
        break;
    case 2:
        printf("Tuesday\n");
        break;
    case 3:
        printf("Wednesday\n");
        break;
    case 4:
        printf("Thursday\n");
        break;
    case 5:
        printf("Friday\n");
        break;
}

```

```
        case 6:
            printf("Saturday\n");
            break;
        default:
            printf("Invalid date\n");
    }

    printf("Do you want to enter another date? (y/n): ");
    scanf(" %c", &c); // notice the space before %c to consume the
    newline character

    } while (c == 'y' || c == 'Y');

    getch();
}
```

### Output:

## Compile Result

```
Enter date in dd-mm-yyyy format: 30 04 2023
Sunday
Do you want to enter another date? (y/n): 
```

---

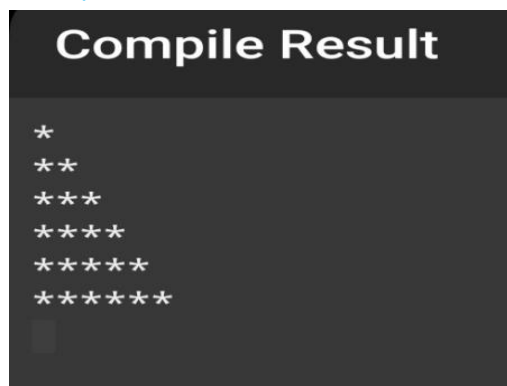
## 5) Patterns

1.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i,j;
    clrscr();
    for(i=0;i<=5;i++)
    {
        for(j=0;j<=i;j++)
        {
            printf("*");
        }
        printf("\n");
    }
    getch();
}
```

Output:



```
Compile Result
*
**
***
****
*****
*****
*****
```

2.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int k=1;
    clrscr();

    for(int i=1;i<=5;i++)
    {
        for(int j=1;j<=i;j++)
        {
            if(k<=15)
            {
                printf(" %d ",k);
                k++;
            }
            else
                break;
        }
        printf("\n");
    }
    getch();
}
```

Output:

#### Compile Result

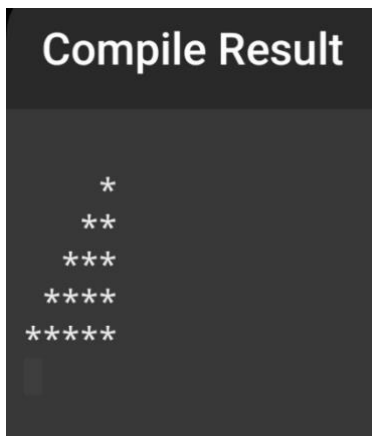
```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

3.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i,j;
    clrscr();
    for(i=0;i<=5;i++)
    {
        for(j=5;j>=1;j--)
        {
            if(i>=j)
                printf("*");
            else
                printf(" ");
        }
        printf("\n");
    }
    getch();
}
```

Output:



```
Compile Result

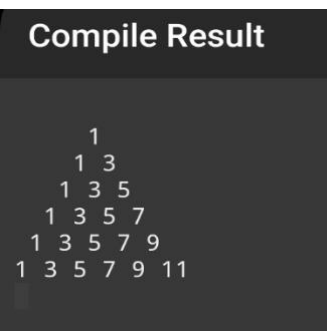
    *
   **
  ***
 ****
*****
```

4.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i,j,k=1;
    clrscr();
    for(i=0;i<=6;i++)
    {
        for(j=6;j>=1;j--)
        {
            if(i>=j)
            {
                printf("%d ",k);
                k+=2;
            }
            else
                printf(" ");
        }
        k=1;
        printf("\n");
    }
    getch();
}
```

Output:



```
Compile Result

1
1 3
1 3 5
1 3 5 7
1 3 5 7 9
1 3 5 7 9 11
1 3 5 7 9 11
```



5.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int rows = 5;
    int i, j, k;
    clrscr();

    for (i = 1; i <= rows; i++)
    {
        // Print spaces
        for (j = i; j < rows; j++)
        {
            printf(" ");
        }

        // Print asterisks
        for (k = 1; k < (i * 2); k++)
        {
            printf("*");
        }

        // Move to next line
        printf("\n");
    }

    getch();
}
```

Output:

## Compile Result

```
  *
 ***
*****
*****
*****
```

6.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int rows = 5;
    int i, j, k;
    clrscr();

    for (i = 1; i <= rows; i++)
    {
        // Print numbers 1 to i
        for (j = 1; j <= i; j++)
        {
            printf("%d", j);
        }

        // Print numbers i-1 down to 1
        for (k = i - 1; k >= 1; k--)
        {
            printf("%d", k);
        }

        // Move to next line
        printf("\n");
    }
}
```

```

    }

    getch();
}

```

### Output:

Compile Result

```

1
121
12321
1234321
123454321

```

## 7.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int i,j;
    clrscr();
    for(i=0;i<=5;i++)
    {
        for(j=5;j>=1;j--)
        {
            if(i>=j)
                printf("* "); //Space makes it aligned to centre;)
            else
                printf(" ");
        }
        printf("\n");
    }
}

```

```
    getch();  
}
```

Output:



8.

Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    int rows=5, i, j, k, space;  
    clrscr();  
  
    for (i = rows; i >= 1; i--)  
    {  
        for (space = 1; space <= rows - i; space++)  
        {  
            printf(" ");  
        }  
        k = i;  
        for (j = 1; j <= 2 * i - 1; j++)  
        {  
            printf("%d", k);  
            if (j < i)  
            {  
                k++;  
            }  
        }  
    }  
}
```

```

        else
        {
            k--;
        }
    }
    printf("\n");
}

getch();
}

```

**Output:**

Compile Result

```

567898765
4567654
34543
232
1

```

**9.**

**Code:**

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int i, j;
    clrscr();

    for (i = 1; i <= 5; i++)
    {
        for (j = 1; j < i; j++)
        {
            printf(" ");

```

```

    }
    for (j = i; j <= 5; j++)
    {
        printf("%d", j);
    }
    printf("\n");
}

getch();
}

```

**Output:**

Compile Result

```

12345
2345
345
45
5

```

**10.**

**Code:**

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int i, j,k;
    int size=3;
    clrscr();

    for (i =size; i >= -size; i--)
    {
        for (j = 1; j <= abs(i); j++)
        {

```

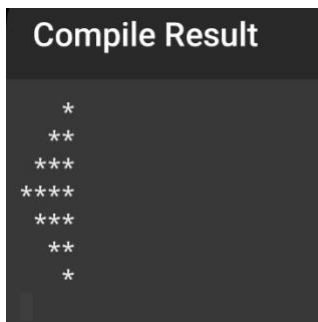
```

        printf(" ");
    }
    for (k =size; k >= abs(i);k--)
    {
        printf("*");
    }
    printf("\n");
}

getch();
}

```

**Output:**



**11.**

**Code:**

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int i,j;
    int size=5;
    clrscr();
    for(i=1;i<=size;i++)
    {
        for(j=0;j<i;j++)
        {

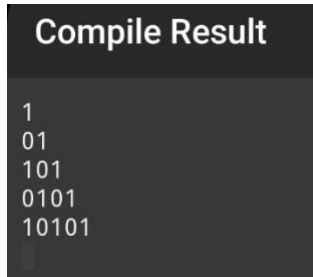
```

```

        printf("%d", (i+j)%2);
    }
    printf("\n");
}
getch();
}

```

### Output:



```

Compile Result
1
01
101
0101
10101

```

## 12.

### Code:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int i, j, num = 1;
    char ch = 'A';
    clrscr();

    for (i = 1; i <= 5; i++)
    {
        for (j = 1; j <= 5-i; j++)
        {
            printf(" ");
        }
        for (j = 1; j <= i; j++)
        {
            if (i % 2 == 0)

```



```
        {
            printf("%c ", ch);
            ch++;
        }
        else
        {
            printf("%d ", num);
            num++;
        }
    }
    printf("\n");
}

getch();;
```

**Output:**

## Compile Result

```
1
A B
2 3 4
C D E F
5 6 7 8 9
```

---

## 6) Arrays and Strings

1.

Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n;
    clrscr();
    printf("Enter the number of elements: ");
    scanf("%d", &n);

    int arr[n];
    printf("Enter %d integers:\n", n);
    for (int i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
    }

    printf("The elements in the array are: ");
    for (int i = 0; i < n; i++)
    {
        printf("%d ", arr[i]);
    }
}
```

```
    getch();  
}
```

## Output:

### Compile Result

```
Enter the number of elements: 5  
Enter 5 integers:  
1  
2  
3  
4  
5  
The elements in the array are: 1 2 3 4 5  
[Process completed (code 10) - press Enter]
```

## 2.

## Code:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    int n = 10;  
    int arr[n];  
    int sum = 0;  
    clrscr();  
  
    printf("Enter %d integers:\n", n);  
    for (int i = 0; i < n; i++)  
    {  
        scanf("%d", &arr[i]);  
        sum += arr[i];  
    }  
}
```

```
float mean = (float)sum / n;

printf("Sum of the numbers is %d\n", sum);
printf("Mean of the numbers is %.2f\n", mean);

getch();
}
```

## Output:

### Compile Result

```
Enter 10 integers:
2
3
1
5
7
4
8
9
10
1
Sum of the numbers is 50
Mean of the numbers is 5.00

[Process completed (code 10) - press Enter]
```

## 3.

### Code:

```
#include <stdio.h>

int main()
{
    int arr[] = {5, 3, 8, 4, 2};
    int n = sizeof(arr) / sizeof(arr[0]);
    int i, j, temp;
```

```
// Sort the array in ascending order
for (i = 0; i < n - 1; i++)
{
    for (j = i + 1; j < n; j++)
    {
        if (arr[i] > arr[j])
        {
            temp = arr[i];
            arr[i] = arr[j];
            arr[j] = temp;
        }
    }
}
```

```
// Print the array in ascending order
printf("Ascending Order: ");
for (i = 0; i < n; i++)
{
    printf("%d ", arr[i]);
}
```

```
// Sort the array in descending order
for (i = 0; i < n - 1; i++)
{
    for (j = i + 1; j < n; j++)
    {
        if (arr[i] < arr[j])
        {
            temp = arr[i];
            arr[i] = arr[j];
            arr[j] = temp;
        }
    }
}
```

```
// Print the array in descending order
```

```

        printf("\nDescending Order: ");
        for (i = 0; i < n; i++)
        {
            printf("%d ", arr[i]);
        }

        return 0;
    }

```

## Output:

### Compile Result

```

Ascending Order: 2 3 4 5 8
Descending Order: 8 5 4 3 2
[Process completed - press Enter]

```

## 4.

## Code:

```

#include<stdio.h>

int main()
{
    int n;

    printf("Enter the size of the array: ");

    scanf("%d", &n);

    int arr[n];

    printf("Enter the elements of the array: ");

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

```

```

        scanf("%d", &arr[i]);
    }
    printf("The array in reverse order is: ");
    for (int i = n-1; i >= 0; i--)
    {
        printf("%d ", arr[i]);
    }
    return 0;
}

```

## Output:

### Compile Result

```

Enter the size of the array: 5
Enter the elements of the array: 7
7
8
5
3
The array in reverse order is: 3 5 8 7 7
[Process completed - press Enter]

```

## 5.

### Code:

```

#include <stdio.h>

int main()
{
    int arr[] = {1, 5, 3, 8, 2};
    int n = sizeof(arr) / sizeof(arr[0]);
}

```

```

int max = arr[0], min = arr[0];

for (int i = 1; i < n; i++)
{
    if (arr[i] > max)
    {
        max = arr[i];
    }
    if (arr[i] < min)
    {
        min = arr[i];
    }
}

printf("Maximum element in array: %d\n", max);
printf("Minimum element in array: %d\n", min);

return 0;
}

```

## Output:

### Compile Result

```

Maximum element in array: 8
Minimum element in array: 1

[Process completed - press Enter]

```

## 6.

## Code:

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



```
int main()
{
    int arr[100], n, x, found = 0;

    printf("Enter the number of elements in the array: ");
    scanf("%d", &n);

    printf("Enter the elements of the array: ");
    for (int i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
    }

    printf("Enter the element to search: ");
    scanf("%d", &x);

    for (int i = 0; i < n; i++)
    {
        if (arr[i] == x)
        {
            printf("Element found at index %d.\n", i);
            found = 1;
            break;
        }
    }

    if (!found)
    {
        arr[n] = x;
        n++;
        printf("Element not found, inserted at index %d.\n", n-1);
    }
}
```

```

        printf("The elements of the array are: ");
        for (int i = 0; i < n; i++)
        {
            printf("%d ", arr[i]);
        }
        printf("\n");

        return 0;
    }

```

## Output:

### Compile Result

```

Enter the number of elements in the array: 5
Enter the elements of the array: 737
727
64
28
83
Enter the element to search: 45
Element not found, inserted at index 5.
The elements of the array are: 737 727 64 28 83 45

[Process completed - press Enter]

```

## 7.

### Code:

```

#include<stdio.h>

int main()
{
    int rows, cols, i, j;
    int matrix[10][10], transpose[10][10];

    printf("Enter the number of rows and columns of the matrix: ");
    scanf("%d %d", &rows, &cols);

```

```

printf("Enter the elements of the matrix: \n");
for (i = 0; i < rows; i++)
{
    for (j = 0; j < cols; j++)
    {
        scanf("%d", &matrix[i][j]);
    }
}

// Transpose the matrix
for (i = 0; i < rows; i++)
{
    for (j = 0; j < cols; j++)
    {
        transpose[j][i] = matrix[i][j];
    }
}

printf("The transpose of the matrix is:\n");
for (i = 0; i < cols; i++)
{
    for (j = 0; j < rows; j++)
    {
        printf("%d ", transpose[i][j]);
    }
    printf("\n");
}

return 0;
}

```

**Output:**

### Compile Result

```
Enter the number of rows and columns of the matrix: 3 3
Enter the elements of the matrix:
1 2 3
4 5 6
7 8 9
The transpose of the matrix is:
1 4 7
2 5 8
3 6 9

[Process completed - press Enter]
```

8.

### Code:

```
#include<stdio.h>

int main()
{
    int rows1, cols1, rows2, cols2, i, j, k;
    int mat1[10][10], mat2[10][10], sum[10][10], product[10][10];

    printf("Enter the number of rows and columns of first matrix: ");
    scanf("%d %d", &rows1, &cols1);

    printf("Enter the elements of the first matrix:\n");
    for (i = 0; i < rows1; i++)
    {
        for (j = 0; j < cols1; j++)
        {
            scanf("%d", &mat1[i][j]);
        }
    }

    printf("Enter the number of rows and columns of second matrix: ");
    scanf("%d %d", &rows2, &cols2);
```

```

printf("Enter the elements of the second matrix:\n");
for (i = 0; i < rows2; i++)
{
    for (j = 0; j < cols2; j++)
    {
        scanf("%d", &mat2[i][j]);
    }
}

// Addition of matrices
if (rows1 == rows2 && cols1 == cols2)
{
    for (i = 0; i < rows1; i++)
    {
        for (j = 0; j < cols1; j++)
        {
            sum[i][j] = mat1[i][j] + mat2[i][j];
        }
    }
    printf("The sum of the two matrices is:\n");
    for (i = 0; i < rows1; i++)
    {
        for (j = 0; j < cols1; j++)
        {
            printf("%d ", sum[i][j]);
        }
        printf("\n");
    }
}
else
{
    printf("Matrices cannot be added.\n");
}

```

```

// Multiplication of matrices
if (cols1 == rows2)
{
    for (i = 0; i < rows1; i++)
    {
        for (j = 0; j < cols2; j++)
        {
            product[i][j] = 0;
            for (k = 0; k < cols1; k++)
            {
                product[i][j] += mat1[i][k] * mat2[k][j];
            }
        }
    }
    printf("The product of the two matrices is:\n");
    for (i = 0; i < rows1; i++)
    {
        for (j = 0; j < cols2; j++)
        {
            printf("%d ", product[i][j]);
        }
        printf("\n");
    }
}
else
{
    printf("Matrices cannot be multiplied.\n");
}

return 0;
}

```

**Output:**

## Compile Result

```
Enter the number of rows and columns of first matrix: 2 2
Enter the elements of the first matrix:
1 0
0 1
Enter the number of rows and columns of second matrix: 2 2
Enter the elements of the second matrix:
1 2
3 4
The sum of the two matrices is:
2 2
3 5
The product of the two matrices is:
1 2
3 4

[Process completed - press Enter]
```

## 9.

### Code:

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

void main()
{
    char str[100];
    clrscr();
    printf("Enter a string: ");
    fgets(str, 100, stdin);

    for (int i = 0; i < strlen(str); i++)
    {
        if (str[i] >= 'A' && str[i] <= 'Z')
        {
            str[i] += 'a' - 'A';
        }
        else if (str[i] >= 'a' && str[i] <= 'z')
        {
            str[i] -= 'a' - 'A';
        }
    }
}
```

```

        {
            str[i] -= 'a' - 'A';
        }
    }

    printf("Toggle case string: %s", str);
    getch();
}

```

## Output:

### Compile Result

```

Enter a string: Darsh A Patel
Toggle case string: dARSH a pATEL

```

## 10.

### Code:

```

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

void main()
{
    char str[100];
    int i, j, len;
    int counter = 1;
    clrscr();

    printf("Enter a string: ");
}

```



```
fgets(str, sizeof(str), stdin);

len = strlen(str) - 1;

i = 0;
j = len - 1;

while (i < len/2)
{
    if (str[i] != str[j])
    {
        counter = 0;
        break;
    }

    i++;
    j--;
}

if (counter == 1)
    printf("%s is a palindrome.\n", str);
else
    printf("%s is not a palindrome.\n", str);

getch();
}
```

**Output:**

## Compile Result

```
Enter a string: racecar
racecar
is a palindrome.
```

## 11.

### Code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    char str[100];
    int i = 0;
    char c;
    clrscr();

    // Using getchar() method
    printf("Enter a string using getchar(): ");

    while ((c = getchar()) != '\n')
    {
        str[i++] = c;
    }
    str[i] = '\0';
    printf("You entered: %s\n", str);

    // Using gets() method
    printf("Enter a string using gets(): ");
    gets(str);
    printf("You entered: %s\n", str);
```

```

// Using scanf() method
printf("Enter a string using scanf(): ");
scanf("%s", str);
printf("You entered: %s\n", str);

// Using scanf() method with %[^\n] format specifier
printf("Enter a string using scanf() with %[^\n]: ");
scanf(" %[^\n]", str);
printf("You entered: %s\n", str);

getch();
}

```

## Output:

### Compile Result

```

Enter a string using getchar(): Darsh
You entered: Darsh
Enter a string using gets(): Darsh
You entered: Darsh
Enter a string using scanf(): Darsh
You entered: Darsh
Enter a string using scanf() with [^\n]: Darsh
You entered: Darsh

[Process completed (code 10) - press Enter]

```

## 12.

### Code:

```

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

```

```
void main()
{
    char str1[50] = "Demon";
    char str2[50] = "Slayer";
    char str3[50];
    int result,len;
    clrscr();

    // Concatenate str1 and str2
    strcat(str1, str2);
    printf("strcat(): %s\n",str1);

    // Compare str1 and str2
    result = strcmp(str1, str2);
    if (result == 0)
    {
        printf("strcmp(): Strings are equal\n");
    }
    else
    {
        printf("strcmp(): Strings are not equal\n");
    }

    // Copy str1 to str3
    strcpy(str3, str1);
    printf("strcpy(): %s\n", str3);

    // Get the length of str1
    len = strlen(str1);
    printf("strlen(): %d\n", len);

    getch();
}
```

## Output:

### Compile Result

```
strcat(): DemonSlayer  
strcmp(): Strings are not equal  
strcpy(): DemonSlayer  
strlen(): 11
```

## 13.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
#include<string.h>  
  
void main()  
{  
    char str[100];  
    int counter = 0, i;  
    clrscr();  
  
    printf("Enter a string: ");  
    scanf("%s", str);  
    char last_char = str[strlen(str)-1]; // Get the last character of the  
    string  
  
    for(i = 0; i < strlen(str); i++)  
    {  
        if(str[i] == last_char)
```

```

        {
            counter++;
        }
    }

    printf("The frequency of '%c' in the string is %d\n", last_char,
counter);

    getch();
}

```

## Output:

### Compile Result

```

Enter a string: tubelight
The frequency of 't' in the string is 2

[Process completed (code 10) - press Enter]

```

## 14.

### Code:

```

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

#define MAX_LENGTH 100
#define MAX_WORDS 100

void main()
{
    char words[MAX_WORDS][MAX_LENGTH];

```

```

int n, i, j;
char temp[MAX_LENGTH];
clrscr();

printf("Enter the number of words: ");
scanf("%d", &n);

printf("Enter %d words: ", n);
for (i = 0; i < n; i++)
{
    scanf("%s", words[i]);
}

for (i = 0; i < n-1; i++)
{
    for (j = 0; j < n-i-1; j++)
    {
        if (strcmp(words[j], words[j+1]) > 0)
        {
            strcpy(temp, words[j]);
            strcpy(words[j], words[j+1]);
            strcpy(words[j+1], temp);
        }
    }
}

printf("\nSorted words:\n");
for (i = 0; i < n; i++) {
    printf("%s\n", words[i]);
}

getch();
}

```

## Output:

### Compile Result

```
Enter the number of words: 3
Enter 3 words: Kimetsu No Yaiba

Sorted words:
Kimetsu
No
Yaiba

[Process completed (code 10) - press Enter]
```

## 15.

### Code:

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

void main()
{
    char str[1000];
    int i;
    clrscr();

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);

    for (i = 0; str[i] != '\0'; i++)
    {
        if (str[i] == ' ' || str[i] == '\t' || str[i] == '\n')
        {
```



```
        str[i] = '*';
    }
}

printf("Result: %s", str);

getch();
}
```

### Output:



```
Compile Result

Enter a string: Darsh A Patel
Result: Darsh*A*Patel*
```

16.

Code:

Output:

17.

Code:

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

```

#define ROWS 3
#define COLS 3

int main()
{
    int matrix[ROWS][COLS] = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
    int evenIndex = 0, oddIndex = ROWS * COLS - 1;

    while (evenIndex < oddIndex)
    {
        // Find the next even element starting from the beginning of the
matrix
        while (matrix[evenIndex / COLS][evenIndex % COLS] % 2 == 0 &&
evenIndex < ROWS * COLS)
        {
            evenIndex++;
        }

        // Find the next odd element starting from the end of the matrix
        while (matrix[oddIndex / COLS][oddIndex % COLS] % 2 == 1 &&
oddIndex >= 0)
        {
            oddIndex--;
        }

        // Swap the even and odd elements if they haven't already passed
each other
        if (evenIndex < oddIndex)
        {
            int temp = matrix[evenIndex / COLS][evenIndex % COLS];
            matrix[evenIndex / COLS][evenIndex % COLS] = matrix[oddIndex /
COLS][oddIndex % COLS];
            matrix[oddIndex / COLS][oddIndex % COLS] = temp;
        }
    }
}

```

```
// Print the matrix after rearrangement
printf("The matrix after rearranging even elements first and odd
elements later:\n");
for (int i = 0; i < ROWS; i++)
{
    for (int j = 0; j < COLS; j++)
    {
        printf("%d ", matrix[i][j]);
    }
    printf("\n");
}

return 0;
}
```

## Output:

### Compile Result

```
The matrix after rearranging even elements first and odd elements later:
8 2 6
4 5 3
7 1 9

[Process completed - press Enter]
```

## 18.

### Code:

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

void main()
{
    int rows, columns;
    clrscr();

    printf("Enter the number of rows and columns in the matrix: ");
    scanf("%d %d", &rows, &columns);

    int matrix[rows][columns];
    printf("Enter the elements of the matrix:\n");
    for (int i = 0; i < rows; i++)
    {
        for (int j = 0; j < columns; j++)
        {
            scanf("%d", &matrix[i][j]);
        }
    }

    printf("Matrix in zigzag order: ");
    for (int i = 0; i < rows; i++)
    {
        if (i % 2 == 0) { // if row is even
            for (int j = 0; j < columns; j++)
            {
                printf("%d ", matrix[i][j]);
            }
        }
        else
        { // if row is odd
            for (int j = columns - 1; j >= 0; j--)
            {
```

```

        printf("%d ", matrix[i][j]);
    }
}
}
getch();
}

```

## Output:

### Compile Result

```

Enter the number of rows and columns in the matrix: 3 3
Enter the elements of the matrix:
1 2 3
5 6 7
9 0 1
Matrix in zigzag order: 1 2 3 7 6 5 9 0 1
[Process completed (code 10) - press Enter]

```

---

## 7) User-defined Functions

### 1.

#### Code:

```

#include<stdio.h>
#include<conio.h>

int sum_of_natural_numbers(int n);

void main()
{

```

```
int n;
clrscr();
printf("Enter the value of N: ");
scanf("%d", &n);

int sum = sum_of_natural_numbers(n);

printf("The sum of first %d natural numbers is %d\n", n, sum);

getch();
}

int sum_of_natural_numbers(int n)
{
    int sum = 0;

    for (int i = 1; i <= n; i++)
    {
        sum += i;
    }

    return sum;
}
```

## Output:

### Compile Result

```
Enter the value of N: 5
The sum of first 5 natural numbers is 15

[Process completed (code 10) - press Enter]
```

## 2.

### Code:

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

int findMax(int num1, int num2, int num3);

void main()
{
    int num1, num2, num3;
    clrscr();

    printf("Enter three numbers: ");
    scanf("%d %d %d", &num1, &num2, &num3);

    printf("The maximum number is %d", findMax(num1, num2, num3));

    getch();
}

int findMax(int num1, int num2, int num3)
{
    int max = num1;

    if (num2 > max)
    {
        max = num2;
    }

    if (num3 > max)
    {
        max = num3;
    }
}
```

```
    }  
  
    return max;  
}
```

## Output:

### Compile Result

```
Enter three numbers: 23  
56  
12  
The maximum number is 56  
[Process completed (code 10) - press Enter]
```

## 3.

## Code:

```
#include<stdio.h>  
#include<conio.h>  
  
double power(int x, int y);  
  
void main()  
{  
    int x, y;  
    clrscr();  
  
    printf("Enter x and y: ");  
    scanf("%d %d", &x, &y);  
  
    double result = power(x, y);  
    printf("%d raised to the power %d is %.2f\n", x, y, result);  
}
```



```

        getch();
    }

double power(int x, int y)
{
    double result = 1.0;

    if (y < 0)
    {
        x = 1 / x;
        y = -y;
    }

    while (y > 0)
    {
        if (y % 2 == 1)
        {
            result *= x;
        }
        x *= x;
        y /= 2;
    }

    return result;
}

```

## Output:

### Compile Result

```

Enter x and y: 4 4
4 raised to the power 4 is 256.00

```

```

[Process completed (code 10) - press Enter]

```

## 4.

### Code:

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

int factorial(int n);

void main()
{
    int n;
    int result;
    clrscr();
    printf("Enter a non-negative integer: ");
    scanf("%d", &n);
    if (n < 0)
    {
        printf("Error: negative input.\n");
    }
    result = factorial(n);
    printf("%d! = %d\n", n, result);
    getch();
}

int factorial(int n)
{
    if (n == 0)
    { // base case
        return 1;
    }
    else
```

```
    {  
        return n * factorial(n-1); // recursive case  
    }  
}
```

## Output:

### Compile Result

```
Enter a non-negative integer: 6  
6! = 720  
[Process completed (code 10) - press Enter]
```

## 5.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
  
void swap(int *a, int *b);  
  
void main()  
{  
    int x = 10, y = 20;  
    clrscr();  
  
    printf("Before swapping, x = %d and y = %d\n", x, y);  
  
    // call swap function to interchange the values of x and y  
    swap(&x, &y);  
  
    printf("After swapping, x = %d and y = %d\n", x, y);  
}
```

```
        getch();
    }

void swap(int *a, int *b)
{
    int temp = *a;
    *a = *b;
    *b = temp;
}
```

### Output:

#### Compile Result

```
Before swapping, x = 10 and y = 20
After swapping, x = 20 and y = 10
```

## 6.

### Code:

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

int prime(int n);

void main()
{
    int n;
    clrscr();

    printf("Enter an integer: ");
```

```
scanf("%d", &n);
if (prime(n))
{
    printf("%d is prime\n", n);
}
else
{
    printf("%d is not prime\n", n);
}
getch();
}
```

```
int prime(int n)
{
    int i;
    if (n <= 1)
    {
        return 0;
    }
    for (i = 2; i*i <= n; i++)
    {
        if (n % i == 0)
        {
            return 0;
        }
    }
    return 1;
}
```

## Output:

### Compile Result

```
Enter an integer: 34
34 is not prime
```

```
[Process completed (code 10) - press Enter]
```

## 7.

### Code:

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

float add(float a, float b);
float subtract(float a, float b);
float multiply(float a, float b);
float divide(float a, float b);

void main()
{
    float a, b;
    char op;
    clrscr();

    printf("Enter an expression (e.g. 2 + 3): ");
    scanf("%f %c %f", &a, &op, &b);

    switch (op)
    {
        case '+':
            printf("%.2f %c %.2f = %.2f\n", a, op, b, add(a, b));
            break;
        case '-':
            printf("%.2f %c %.2f = %.2f\n", a, op, b, subtract(a, b));
            break;
        case '*':
            printf("%.2f %c %.2f = %.2f\n", a, op, b, multiply(a, b));
            break;
```

```

        case '/':
            printf("%.2f %c %.2f = %.2f\n", a, op, b, divide(a, b));
            break;
        default:
            printf("Error: invalid operator\n");
            break;
    }

    getch();
}

float add(float a, float b)
{
    return a + b;
}

float subtract(float a, float b)
{
    return a - b;
}

float multiply(float a, float b)
{
    return a * b;
}

float divide(float a, float b)
{
    if (b == 0)
    {
        printf("Error: division by zero\n");
        return 0;
    }
    return a / b;
}

```

```
}
```

## Output:

### Compile Result

```
Enter an expression (e.g. 2 + 3): 4/2  
4.00 / 2.00 = 2.00
```

```
[Process completed (code 10) - press Enter]
```

## 8.

### Code:

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

void add_no_args_no_return();
void add_with_args_no_return(int a, int b);
int add_with_args_one_return(int a, int b);
int add_no_args_one_return();

void main()
{
    int x = 10, y = 15, result;
    clrscr();

    add_no_args_no_return();

    add_with_args_no_return(x, y);

    result = add_with_args_one_return(x, y);
    printf("Result (args, one return): %d\n", result);
```



```
    result = add_no_args_one_return();  
    printf("Result (no args, one return): %d\n", result);  
  
    getch();  
}
```

```
void add_no_args_no_return()  
{  
    int a = 5, b = 7, sum;  
    sum = a + b;  
    printf("Sum (no args, no return): %d\n", sum);  
}
```

```
void add_with_args_no_return(int a, int b)  
{  
    int sum;  
    sum = a + b;  
    printf("Sum (args, no return): %d\n", sum);  
}
```

```
int add_with_args_one_return(int a, int b)  
{  
    int sum;  
    sum = a + b;  
    return sum;  
}
```

```
int add_no_args_one_return()  
{  
    int a, b, sum;  
    printf("Enter two integers: ");  
    scanf("%d %d", &a, &b);  
    sum = a + b;
```

```
    return sum;
}
```

## Output:

### Compile Result

```
Sum (no args, no return): 12
Sum (args, no return): 25
Result (args, one return): 25
Enter two integers: 2 4
Result (no args, one return): 6

[Process completed (code 10) - press Enter]
```

## 9.

### Code:

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

char* opposite_case(char* str);

void main()
{
    char str[100];
    clrscr();

    printf("Enter a string: ");
    scanf("%[^\\n]s", str);

    printf("Original string: %s\\n", str);
```

```

    opposite_case(str);
    printf("Opposite case string: %s\n", str);

    getch();
}

char* opposite_case(char* str)
{
    int len = strlen(str);
    for (int i = 0; i < len; i++)
    {
        if (str[i] >= 'a' && str[i] <= 'z')
        {
            str[i] = str[i] - 'a' + 'A';
        }
        else if (str[i] >= 'A' && str[i] <= 'Z')
        {
            str[i] = str[i] - 'A' + 'a';
        }
    }
    return str;
}

```

## Output:

### Compile Result

```

Enter a string: Darsh A Patel
Original string: Darsh A Patel
Opposite case string: dARSH a pATEL

```

```
[Process completed (code 10) - press Enter]
```

## 10.

### Code:

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

int fibonacci(int n);

void main()
{
    int n;
    clrscr();

    printf("Enter the number of terms in the Fibonacci sequence: ");
    scanf("%d", &n);

    printf("Fibonacci sequence: ");
    for (int i = 0; i < n; i++)
    {
        printf("%d ", fibonacci(i));
    }

    getch();
}

int fibonacci(int n)
{
    if (n <= 1)
    {
        return n;
    }
    else
    {

```

```
        return fibonacci(n-1) + fibonacci(n-2);  
    }  
}
```

## Output:

### Compile Result

```
Enter the number of terms in the Fibonacci sequence: 7  
Fibonacci sequence: 0 1 1 2 3 5 8  
[Process completed (code 10) - press Enter]
```

---

## 8) Structure and Pointers

1.

Code:

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

struct personal
{
    char name[50];
    char join_date[20];
    float salary;
};

void main()
{
    struct personal p;
    clrscr();

    printf("Enter Employee Name:");
    fgets(p.name,50,stdin);

    printf("\nEnter Joining Date:");
    fgets(p.join_date,20,stdin);

    printf("\nEnter Salary:");
    scanf("%f",&p.salary);

    printf("The Input Values are:\n");
```

```
    puts(p.name);
    puts(p.join_date);
    printf("Salary: %.2f",p.salary);

    getch();
}
```

## Output:

### Compile Result

Enter Employee Name:Darsh

Enter Joining Date:26 10 2029

Enter Salary:400000

The Input Values are:

Darsh

26 10 2029

Salary: 400000.00

[Process completed (code 10) - press Enter]

## 2.

### Code:

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

struct cricket
{
    char player_name[50];
    char team_name[50];
    float batting_average;
};
```

```
void main()
{
    struct cricket player1;
    clrscr();

    // Example usage of the cricket structure
    printf("Enter player name: ");
    fgets(player1.player_name, 50, stdin);

    printf("Enter team name: ");
    fgets(player1.team_name, 50, stdin);

    printf("Enter batting average: ");
    scanf("%f", &player1.batting_average);

    printf("Player name:      %s", player1.player_name);
    printf("Team name:       %s", player1.team_name);
    printf("Batting average: %.2f\n", player1.batting_average);

    getch();
}
```

## Output:

### Compile Result

```
Enter player name: MS Dhoni
Enter team name: India
Enter batting average: 37.6
Player name:      MS Dhoni
Team name:       India
Batting average: 37.60
```

```
[Process completed (code 10) - press Enter]
```



### 3.

#### Code:

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

struct student
{
    int roll,m1,m2,m3;
    float avg;
    char sname[20];
}S[3];

void main()
{
    int i;
    clrscr();

    for(i=0;i<3;i++)
    {
        printf("\n Enter student name:");
        scanf("%s",&S[i].sname);

        printf("\n Enter Roll no:");
        scanf("%d",&S[i].roll);

        printf("\n Enter marks in 3 Subjects :");
        scanf("%d %d %d",&S[i].m1,&S[i].m2,&S[i].m3);

        S[i].avg= (S[i].m1+S[i].m2+S[i].m3)/3;
    }

    printf("\n Data Collected:\n");
```

```

    for(i=0;i<3;i++)
    {
        printf("\n Student Name      : %s",S[i].sname);
        printf("\n Roll No          : %d",S[i].roll);
        printf("\n Average of marks : %f",S[i].avg);
    }
    getch();
}

```

## Output:

### Compile Result

```

Enter student name:Darsh
Enter Roll no:8
Enter marks in 3 Subjects :74 96 52
Enter student name:Jaimin
Enter Roll no:24
Enter marks in 3 Subjects :57 52 96
Enter student name:Dhaval
Enter Roll no:12
Enter marks in 3 Subjects :47 86 96

Data Collected:

Student Name      : Darsh
Roll No          : 8
Average of marks  : 74.000000
Student Name      : Jaimin
Roll No          : 24
Average of marks  : 68.000000
Student Name      : Dhaval
Roll No          : 12
Average of marks  : 76.000000
[Process completed (code 10) - press Enter]

```

## 4.

### Code:

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

// Define the time_struct data type
struct time_struct
{
    int hour;
    int minute;
    int second;
};

void main()
{
    // Create a variable of type time_struct
    struct time_struct time;
    clrscr();

    // Assign values to the members of the time_struct
    printf("Enter Hour in 24 hr system:");
    scanf("%d",&time.hour);

    printf("Enter Minutes:");
    scanf("%d",&time.minute);

    printf("Enter Seconds:");
    scanf("%d",&time.second);

    // Display the time in the desired format
    printf("%d:%d:%d\n", time.hour, time.minute, time.second);
```

```
    getch();  
}
```

## Output:

### Compile Result

```
Enter Hour in 24 hr system:16  
Enter Minutes:40  
Enter Seconds:51  
16:40:51  
  
[Process completed (code 10) - press Enter]
```

## 5.

### Code:

```
#include<stdio.h>  
#include<conio.h>  
  
// Define a union  
union Data  
{  
    int i;  
    float f;  
    char str[20];  
};  
  
void main()  
{  
    union Data data;  
    clrscr();
```

```
// Assign a value to the integer member
data.i = 10;
printf("data.i: %d\n", data.i);

// Assign a value to the float member
data.f = 3.14;
printf("data.f: %f\n", data.f);

// Assign a value to the string member
strcpy(data.str, "Hello World!");
printf("data.str: %s\n", data.str);

getch();
}
```

## Output:

### Compile Result

```
data.i: 10
data.f: 3.140000
data.str: Hello World!
```

## 6.

### Code:

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

int stringLength(char *str)
{
```

```

int length = 0;
while (*str != '\0')
{
    length++;
    str++;
}
return length;
}

void main()
{
    char str[] = "Hello World";
    int length = stringLength(str);
    clrscr();

    printf("The length of the string \"%s\" is %d.\n", str, length);
    getch();
}

```

### Output:

## Compile Result

```
The length of the string "Hello World" is 11.
```

## 7.

### Code:

```

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

```

```

void main()
{
    char str1[50], str2[50], str3[50];
    char *p1, *p2, *p3;
    clrscr();

    printf("Enter the first string: ");
    scanf("%s", str1);

    printf("Enter the second string: ");
    scanf("%s", str2);

    // Copying the first string to the third string using pointers
    p1 = str1;
    p3 = str3;
    while (*p1 != '\0')
    {
        *p3 = *p1;
        p1++;
        p3++;
    }
    *p3 = '\0';

    printf("The first string is: %s\n", str1);
    printf("The second string is: %s\n", str2);
    printf("The third string (copy of first string) is: %s\n", str3);

    // Comparing the first and second strings using pointers
    p1 = str1;
    p2 = str2;
    while (*p1 == *p2 && *p1 != '\0' && *p2 != '\0')
    {
        p1++;
    }

```

```

        p2++;
    }
    if (*p1 == *p2)
    {
        printf("The first and second strings are equal.\n");
    }
    else if (*p1 > *p2)
    {
        printf("The first string is greater than the second string.\n");
    }
    else
    {
        printf("The second string is greater than the first string.\n");
    }

    // Concatenating the first and second strings using pointers
    p1 = str1;
    p3 = str3;
    while (*p1 != '\0')
    {
        *p3 = *p1;
        p1++;
        p3++;
    }
    p2 = str2;
    while (*p2 != '\0')
    {
        *p3 = *p2;
        p2++;
        p3++;
    }
    *p3 = '\0';

```



```
    printf("The concatenation of the first and second strings is: %s\n",
str3);

    getch();
}
```

## Output:

```
Compile Result

Enter the first string: Darsh
Enter the second string: Patel
The first string is: Darsh
The second string is: Patel
The third string (copy of first string) is: Darsh
The second string is greater than the first string.
The concatenation of the first and second strings is: DarshPatel

[Process completed (code 10) - press Enter]
```

## 8.

## Code:

```
#include <stdio.h>

int main()
{
    int n;
    printf("Enter the number of elements in the array: ");
    scanf("%d", &n);

    int arr[n];

    printf("Enter %d integers:\n", n);
    for (int i = 0; i < n; i++)
    {
        scanf("%d", arr + i);
    }
}
```

```

    }

    printf("The array in reverse order:\n");
    for (int i = n - 1; i >= 0; i--)
    {
        printf("%d ", *(arr + i));
    }

    return 0;
}

```

## Output:

```

Compile Result

Enter the number of elements in the array: 5
Enter 5 integers:
1
2
3
4
5
The array in reverse order:
5 4 3 2 1
[Process completed - press Enter]

```

## 9.

## Code:

```

#include<stdio.h>

int main()
{
    int x = 286128;

```

```
int *ptr = &x; // declare a pointer and initialize it to the address of
x

printf("Value of x: %d\n", x);
printf("Value of ptr: %p\n", (void *)ptr);
printf("Value pointed by ptr: %d\n", *ptr); // use indirection operator
to access value pointed by ptr

return 0;
}
```

## Output:

### Compile Result

```
Value of x: 286128
Value of ptr: 0x7fef091ed8
Value pointed by ptr: 286128

[Process completed - press Enter]
```

## 10.

### Code:

```
#include<stdio.h>

int main()
{
    int a = 10, b = 5;
```

```
int *ptr1 = &a; // pointer to a
int *ptr2 = &b; // pointer to b

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

// perform arithmetic operations using pointers
int sum = *ptr1 + *ptr2;
int diff = *ptr1 - *ptr2;
int prod = *ptr1 * *ptr2;
int quot = *ptr1 / *ptr2;

printf("Sum of a and b: %d\n", sum);
printf("Difference of a and b: %d\n", diff);
printf("Product of a and b: %d\n", prod);
printf("Quotient of a and b: %d\n", quot);

return 0;
}
```

## Output:

### Compile Result

```
Value of a: 10
Value of b: 5
Sum of a and b: 15
Difference of a and b: 5
Product of a and b: 50
Quotient of a and b: 2
```

## 11.

## Code:

```
#include<stdio.h>

// function that takes an integer argument by value
void callByValue(int x);

// function that takes an integer argument by reference
void callByReference(int *y);

int main()
{
    int num = 5;

    printf("Before function calls:\n");
    printf("Value of num: %d\n", num);

    // call function using call by value
    callByValue(num);
    printf("After callByValue function call:\n");
    printf("Value of num: %d\n", num);

    // call function using call by reference
    callByReference(&num);
    printf("After callByReference function call:\n");
    printf("Value of num: %d\n", num);

    return 0;
}

void callByValue(int x)
{
    x = x + 10;
    printf("Inside callByValue function: %d\n", x);
}
```

```
void callByReference(int *y)
{
    *y = *y + 10;
    printf("Inside callByReference function: %d\n", *y);
}
```

## Output:

### Compile Result

```
Before function calls:
Value of num: 5
Inside callByValue function: 15
After callByValue function call:
Value of num: 5
Inside callByReference function: 15
After callByReference function call:
Value of num: 15

[Process completed - press Enter]
```

---



(Inspired From The One Piece Series;))