

ST. JOSEPH UNIVERSITY IN TANZANIA

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List of Experiments

1. Write a program in C to find the Simple Interest.
2. Write a program in C to find the Compound Interest.
3. Write a program in C for temperature conversions:
 - a. Fahrenheit to Centigrade.
 - b. Centigrade to Fahrenheit.
4. Write a program in C using Control Structures.
5. Write a program in C using Switch Case Conditions.
6. Write a program in C to find the sum of the given series:
 - a. $1+2+3+\dots+n$
 - b. $1^2+2^2+\dots+n^2$
 - c. $1^3+2^3+\dots+n^3$
7. Write a program in C to find the sum of odd and even numbers.
8. Write a program in C to find the factorial of a given number using Recursive function.
9. Write a program in C to perform Matrix Addition.
10. Write a program in C to perform Matrix Multiplication.
11. Write a program in C to find the biggest of 'n' numbers using functions and arrays.
12. Write a program in C to illustrate different string methods.
13. Write a program in C to design the "Student Mark Sheets" using Structures.
14. Write a program in C to calculate the area of various shapes (triangle, rectangle, square, circle and cylinder) using functions.
15. Write a program in C to design the "Employee Payroll Processing" using Structures.
16. Write a program in C to print the value and address of the elements of an array using array of pointers.
17. Write a program in C to perform binary search.

THE

C

PROGRAMMING

LANGUAGE



Experiment 1

```
/*Simple Interest*/
```

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

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

```
void main()
```

```
{
```

```
    float p,q,r,si;
```

```
    int n;
```

```
    clrscr();
```

```
    printf("Enter the value of Principal p = ");
```

```
    scanf("%f",&p);
```

```
    printf("Enter the value of Rate r = ");
```

```
    scanf("%f",&r);
```

```
    printf("Enter the value of Period in years n = ");
```

```
    scanf("%d",&n);
```

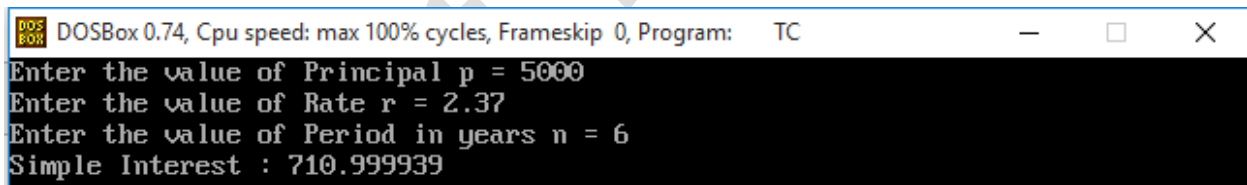
```
    si = ((p*r*n)/100);
```

```
    printf("Simple Interest : %f \n",si);
```

```
    getch();
```

```
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the value of Principal p = 5000
Enter the value of Rate r = 2.37
Enter the value of Period in years n = 6
Simple Interest : 710.999939
```

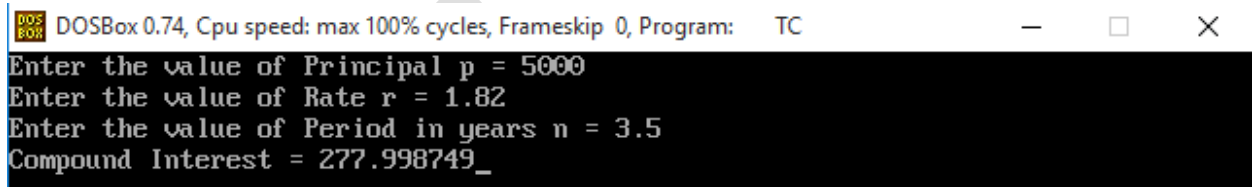
Experiment 2

```
/*Compound Interest*/

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

void main()
{
    float p,q,r,ci;
    int n;
    clrscr();
    printf("Enter the value of Principal p = ");
    scanf("%f",&p);
    printf("Enter the value of Rate r = ");
    scanf("%f",&r);
    printf("Enter the value of Period in years n = ");
    scanf("%d",&n);
    ci = p * (pow((1 + r / 100), n)-1);
    printf("Compound Interest = %f", ci);
    getch();
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the value of Principal p = 5000
Enter the value of Rate r = 1.82
Enter the value of Period in years n = 3.5
Compound Interest = 277.998749_
```

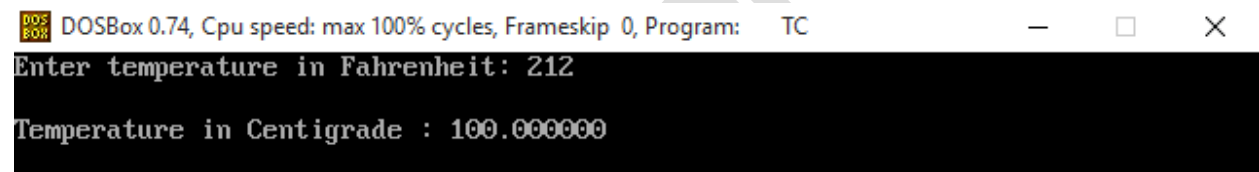
Experiment 3a

/*Fahrenheit to Centigrade Temperature Conversion*/

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

```
void main()
{
    float centigrade, fahrenheit;
    clrscr();
    printf("Enter temperature in Fahrenheit: ");
    scanf("%f", &fahrenheit);
    centigrade = (fahrenheit-32) * 5/9;
    printf("\nTemperature in Centigrade : %f ", centigrade);
    getch();
}
```

Output



The screenshot shows a DOSBox window titled "DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC". The window has a black background with white text. The first line of text is "Enter temperature in Fahrenheit: 212". The second line of text is "Temperature in Centigrade : 100.000000".

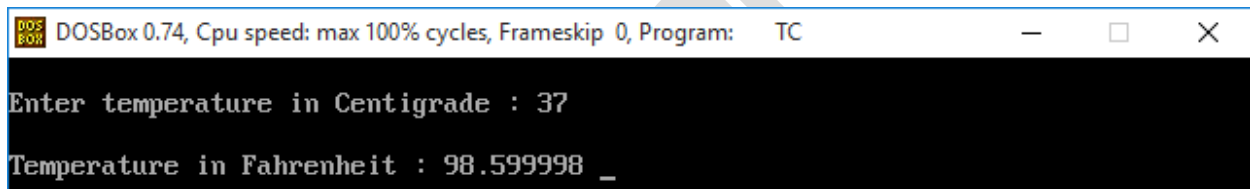
Experiment 3b

/*Centigrade to Fahrenheit Temperature Conversion*/

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

```
void main()
{
    float centigrade, fahrenheit;
    clrscr();
    printf("\nEnter temperature in Centigrade : ");
    scanf("%f", &centigrade);
    fahrenheit = (1.8 * centigrade) + 32;
    printf("\nTemperature in Fahrenheit : %f ", fahrenheit);
    getch();
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter temperature in Centigrade : 37
Temperature in Fahrenheit : 98.599998 _
```

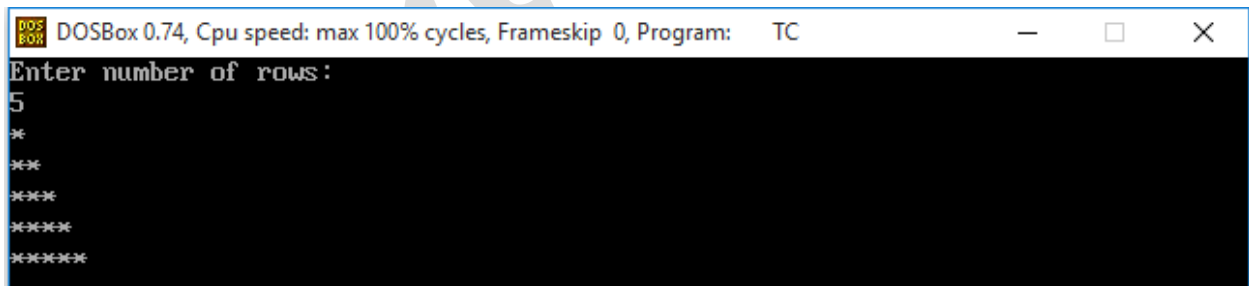
Experiment 4

/*Control Structures to generate Star pattern*/

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

void main()
{
    int n,i,j;
    clrscr();
    printf("Enter number of rows: \n");
    scanf("%d",&n);
    for (i=1;i<=n;i++)
    {
        for(j=1;j<=i;j++)
        {
            printf("*");
        }
        printf("\n");
    }
    getch();
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter number of rows:
5
*
**
***
****
*****
```

Experiment 5

```
/*Switch case*/
```

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

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

```
void main()
```

```
{
```

```
    char choice;
```

```
    int a,b;
```

```
    clrscr();
```

```
    while(1)
```

```
    {
```

```
        printf("\n\n1. + (Add) ");
```

```
        printf("\n2. - (Subtract)");
```

```
        printf("\n3. * (Multiply)");
```

```
        printf("\n4. / (Divide)");
```

```
        printf("\n5. % (Modulus)");
```

```
        printf("\n6. E (Exit)");
```

```
        printf("\nEnter two numbers: ");
```

```
        scanf("%d\n%d",&a, &b);
```

```
        printf("\nEnter the operator (+,-,*,/,%): ");
```

```
        scanf("%s", &choice);
```

```
        switch(choice)
```

```
        {
```

```
            case '+':
```

```
                printf("%d + %d = %d",a,b,(a+b));
```

```
                break;
```

```
            case '-':
```

```
                printf("%d - %d = %d",a,b,(a-b));
```

```
                break;
```

```
            case '*':
```

```
                printf("%d * %d = %d",a,b,(a*b));
```

```
                break;
```

```
            case '/':
```

```
                printf("%d / %d = %d",a,b,(a/b));
```

```
                break;
```

```
            case '%':
```

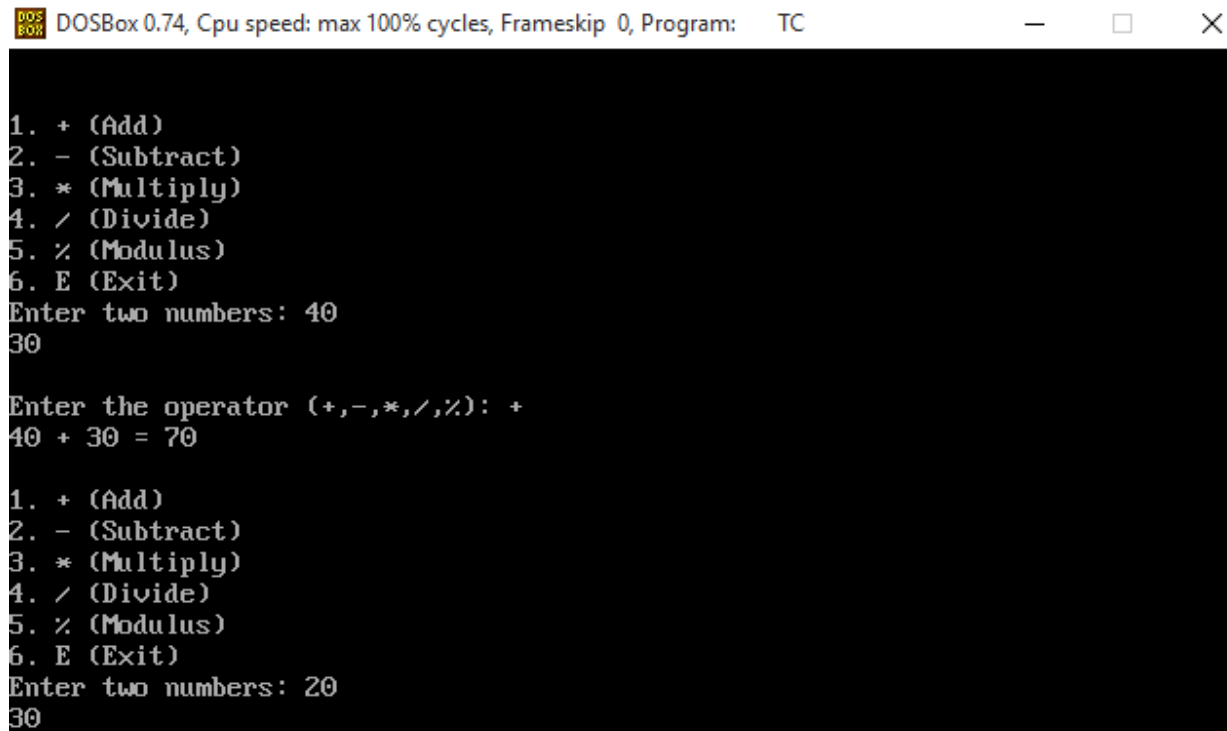
```
                printf("%d mod %d = %d",a,b,(a%b));
```

```
        break;

    case 'e':
        exit(0);
        break;

    default:
        printf("Error. Incorrect Choice.");
    }
}
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC

1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)
Enter two numbers: 40
30

Enter the operator (+,-,*,/,%): +
40 + 30 = 70

1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)
Enter two numbers: 20
30
```

Enter the operator (+,-,*,/,%): -
20 - 30 = -10

1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)

Enter two numbers: 50
50

Enter the operator (+,-,*,/,%): *
50 * 50 = 2500

1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)

Enter two numbers: 600
30

Enter the operator (+,-,*,/,%): /
600 / 30 = 20

1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)

Enter two numbers: 31
4

Enter the operator (+,-,*,/,%): %
31 mod 4 = 3

```
1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)
Enter two numbers: 1
2

Enter the operator (+,-,*,/,%): $
Error. Incorrect Choice.

1. + (Add)
2. - (Subtract)
3. * (Multiply)
4. / (Divide)
5. % (Modulus)
6. E (Exit)
Enter two numbers: 1
2

Enter the operator (+,-,*,/,%): e_
```

Experiment 6a

/*Sum of the series 1+2+3+...+n*/

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

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

```
void main()
```

```
{
```

```
    int n,i;
```

```
    int sum=0;
```

```
    clrscr();
```

```
    printf("Enter the value of n: ");
```

```
    scanf("%d",&n);
```

```
    sum = (n * (n + 1)) / 2;
```

```
    printf("Sum of the series: ");
```

```
    for(i=1;i <= n;i++)
```

```
    {
```

```
        if (i!=n)
```

```
            printf("%d + ",i);
```

```
        else
```

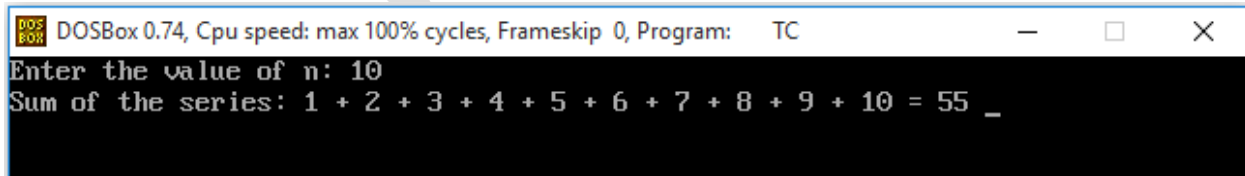
```
            printf("%d = %d ",i,sum);
```

```
    }
```

```
    getch();
```

```
}
```

Output



The screenshot shows a DOSBox 0.74 window with the title bar 'DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC'. The command prompt inside shows the program execution: 'Enter the value of n: 10' followed by 'Sum of the series: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55 _'.

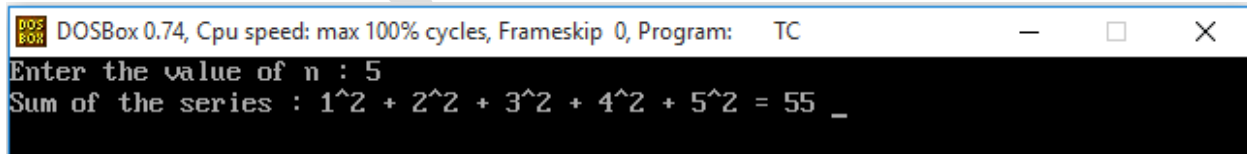
Experiment 6b

/*Sum of the series $1^2+2^2+\dots+n^2$ */

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

```
void main()
{
    int n,i;
    int sum=0;
    clrscr();
    printf("Enter the value of n : ");
    scanf("%d",&n);
    sum = (n * (n + 1) * (2 * n + 1 )) / 6;
    printf("Sum of the series : ");
    for(i =1;i<=n;i++)
    {
        if (i != n)
            printf("%d^2 + ",i);
        else
            printf("%d^2 = %d ",i,sum);
    }
    getch();
}
```

Output



The screenshot shows a DOSBox 0.74 window with the title bar "DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC". The window contains the following text:

```
Enter the value of n : 5
Sum of the series : 1^2 + 2^2 + 3^2 + 4^2 + 5^2 = 55 _
```

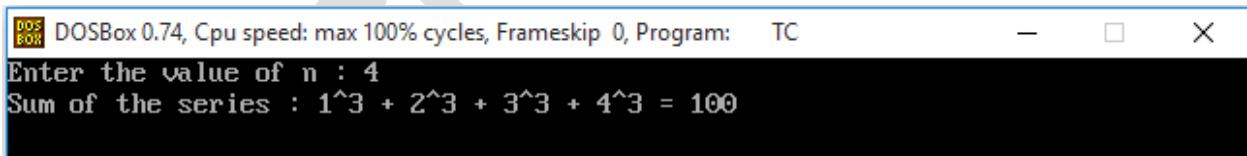
Experiment 6c

/*Sum of the series $1^3+2^3+\dots+n^3$ */

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

void main()
{
    int n,i;
    int sum=0;
    clrscr();
    printf("Enter the value of n : ");
    scanf("%d",&n);
    sum = pow(((n * (n + 1) ) / 2),2);
    printf("Sum of the series : ");
    for(i =1;i<=n;i++)
    {
        if (i != n)
            printf("%d^3 + ",i);
        else
            printf("%d^3 = %d ",i,sum);
    }
    getch();
}
```

Output



DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC

```
Enter the value of n : 4
Sum of the series : 1^3 + 2^3 + 3^3 + 4^3 = 100
```

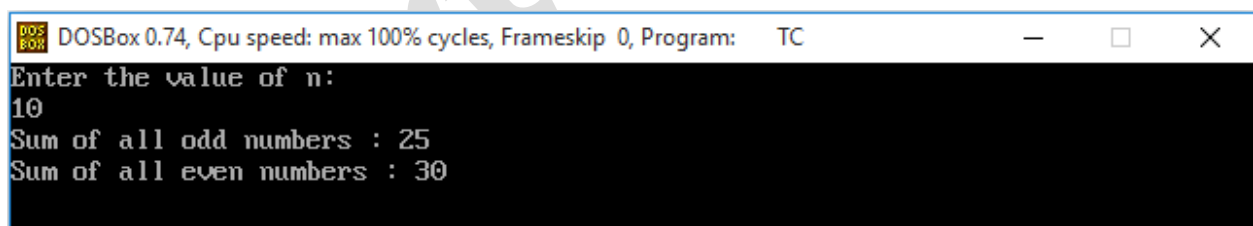
Experiment 7

/*Sum of Odd and Even Numbers*/

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

```
void main()
{
    int i, n, odd_sum = 0, even_sum = 0;
    clrscr();
    printf("Enter the value of n: \n");
    scanf("%d", &n);
    for (i=1;i<=n;i++)
    {
        if (i%2==0)
            even_sum=even_sum+i;
        else
            odd_sum=odd_sum+i;
    }
    printf("Sum of all odd numbers : %d\n", odd_sum);
    printf("Sum of all even numbers : %d\n", even_sum);
    getch();
}
```

Output

A screenshot of a DOSBox 0.74 window. The title bar shows 'DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC'. The window has standard minimize, maximize, and close buttons. The main area is a black terminal with white text. It shows the prompt 'Enter the value of n:', followed by the user input '10'. Below that, it displays 'Sum of all odd numbers : 25' and 'Sum of all even numbers : 30'.

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the value of n:
10
Sum of all odd numbers : 25
Sum of all even numbers : 30
```

Experiment 8

/*Factorial using Recursive function*/

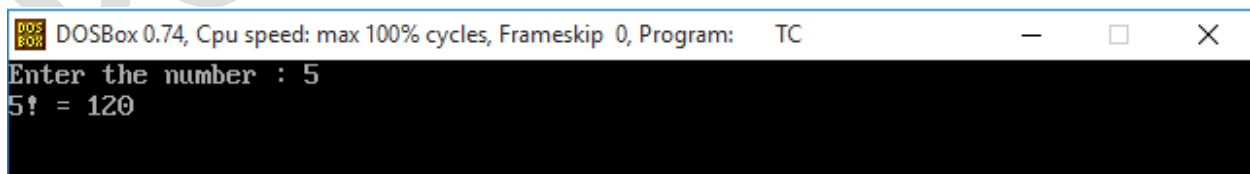
```
#include<stdio.h>
#include<conio.h>
```

```
long factorial(int);
```

```
void main()
{
    int n;
    long f;
    clrscr();
    printf("Enter the number : ");
    scanf("%d", &n);
    if(n<0)
        printf("Negative integers are not allowed.\n");
    else
    {
        f = factorial(n);
        printf("%d! = %ld\n", n, f);
    }
    getch();
}
```

```
long factorial(int n)
{
    if(n==0)
        return 1;
    else
        return(n*factorial(n-1));
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the number : 5
5! = 120
```

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the number : -1
Negative integers are not allowed.
```

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Experiment 9

```
/*Matrix Addition*/
```

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

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

```
void main()
```

```
{
```

```
    int a[3][3],b[3][3],c[3][3],i,j,m,n;
```

```
    clrscr();
```

```
    printf("Matrix Addition\n");
```

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

```
    printf("\nEnter number of rows : ");
```

```
    scanf("%d", &m);
```

```
    printf("Enter number of columns: ");
```

```
    scanf("%d", &n);
```

```
    printf("\n\nEnter the First matrix :\n");
```

```
    for(i=0;i<m;i++)
```

```
    {
```

```
        for(j=0;j<n;j++)
```

```
        {
```

```
            printf("Row[%d]Column[%d]:",(i+1),(j+1));
```

```
            scanf("%d",&a[i][j]);
```

```
        }
```

```
    }
```

```
    printf("\n\nEnter the Second matrix :\n");
```

```
    for(i=0;i<m;i++)
```

```
    {
```

```
        for(j=0;j<n;j++)
```

```
        {
```

```
            printf("Row[%d]Column[%d]:",(i+1),(j+1));
```

```
            scanf("%d",&b[i][j]);
```

```
        }
```

```
    }
```

```
    printf("\n\nThe First matrix is:\n");
```

```
    for(i=0;i<m;i++)
```

```
    {
```

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

```
        for(j=0;j<n;j++)
```

```
        {
```

```
            printf("%d\t",a[i][j]);
```

```
        }
```

```
    }
```

```
printf("\n\nThe Second matrix is:\n");
for(i=0;i<m;i++)
{
    printf("\n");
    for(j=0;j<n;j++)
    {
        printf("%d\t",b[i][j]);
    }
}
for(i=0;i<m;i++)
{
    for(j=0;j<n;j++)
    {
        c[i][j]=a[i][j]+b[i][j];
    }
}

printf("\n\nThe Addition of the two matrices is : \n");
for(i=0;i<m;i++)
{
    printf("\n");
    for(j=0;j<n;j++)
    {
        printf("%d\t",c[i][j]);
    }
}
getch();
}
```

Output

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Matrix Addition
*****

Enter number of rows : 2
Enter number of columns: 2

Enter the First matrix :
Row[1]Column[1]:1
Row[1]Column[2]:0
Row[2]Column[1]:0
Row[2]Column[2]:1

Enter the Second matrix :
Row[1]Column[1]:0
Row[1]Column[2]:1
Row[2]Column[1]:1
Row[2]Column[2]:0

The First matrix is:

1      0
0      1

The Second matrix is:

0      1
1      0

The Addition of the two matrices is :

1      1
1      1
```

Experiment 10

/*Matrix Multiplication*/

#include <stdio.h>

#include <conio.h>

void main()

```
{
    int i,j,k,m,n,p,q,sum = 0;
    int first[10][10],second[10][10],product[10][10];
    clrscr();
    printf("Matrix Multiplication\n");
    printf("*****\n");
    printf("\nEnter the number of rows and columns of the first matrix: \n");
    scanf("%d %d", &m, &n);
    printf("\nEnter the elements of first matrix: \n");
    for (i=0;i<m;i++)
    {
        for (j=0;j<n;j++)
        {
            printf("Row[%d]Column[%d]:",(i+1),(j+1));
            scanf("%d", &first[i][j]);
        }
    }
    printf("\nEnter the number of rows and columns of the second matrix\n");
    scanf("%d%d", &p, &q);
    if (n!=p)
    {
        printf("\nMatrices are not compatible.\n");
        printf("Number of columns of first matrix should equal number of rows of the second one.\n");
    }
    else
    {
        printf("\nEnter the elements of second matrix: \n");
        for (i=0;i<p;i++)
        {
            for (j=0;j<q;j++)
            {
                printf("Row[%d]Column[%d]:",(i+1),(j+1));
                scanf("%d", &second[i][j]);
            }
        }
        for (i=0;i<m;i++)
        {
```

```

        for (j=0;j<q;j++)
        {
            for(k=0;k<p;k++)
            {
                sum=sum+first[i][k]*second[k][j];
            }
            product[i][j] = sum;
            sum = 0;
        }
    }

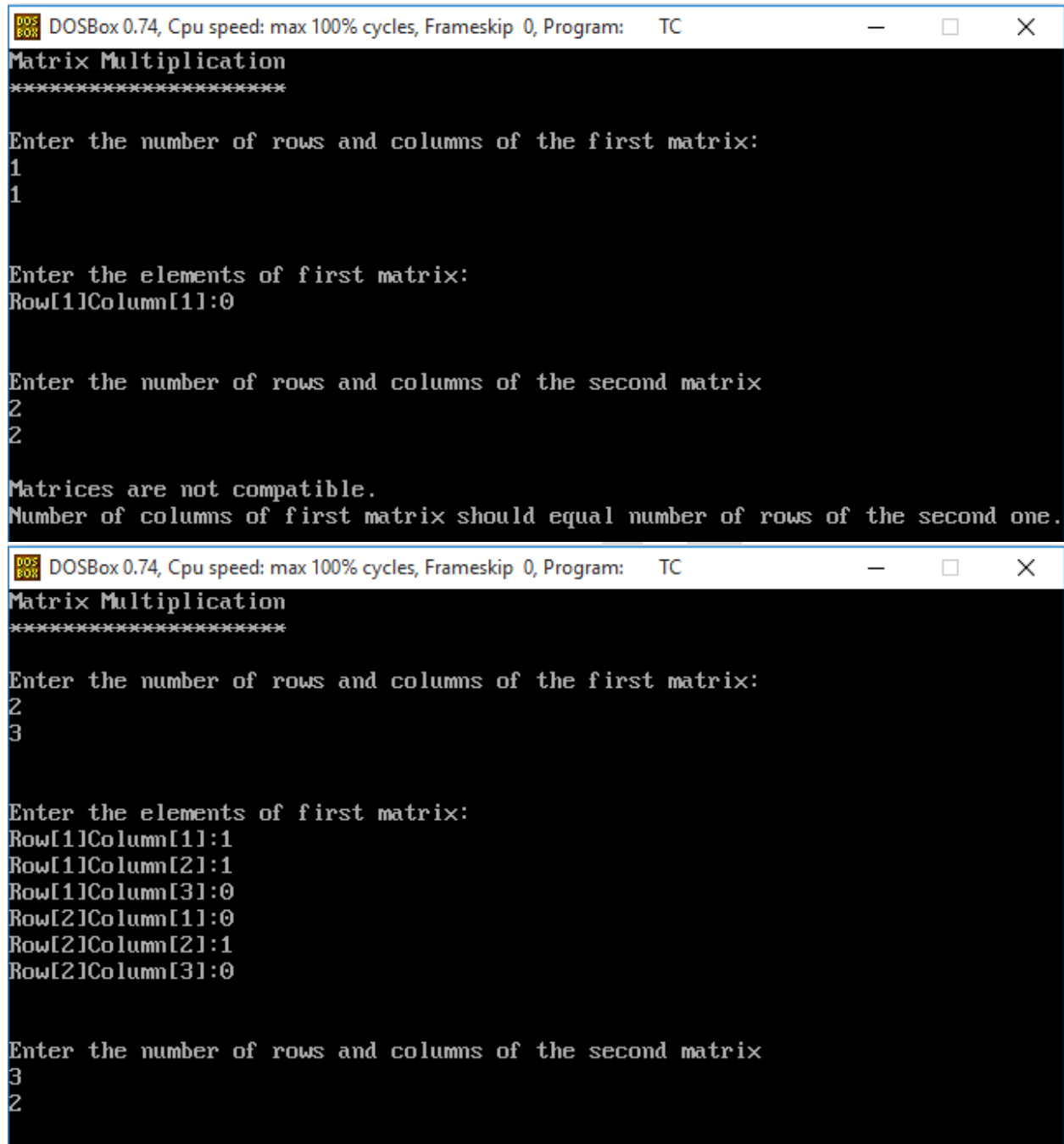
    printf("\n\nThe First matrix is:\n");
    for(i=0;i<m;i++)
    {
        printf("\n");
        for(j=0;j<n;j++)
        {
            printf("%d\t",first[i][j]);
        }
    }

    printf("\n\nThe Second matrix is:\n");
    for(i=0;i<p;i++)
    {
        printf("\n");
        for(j=0;j<q;j++)
        {
            printf("%d\t",second[i][j]);
        }
    }

    printf("\n\nProduct of entered matrices: \n");
    for (i=0;i<m;i++)
    {
        for (j=0;j<q;j++)
        {
            printf("%d\t", product[i][j]);
        }
        printf("\n");
    }
}
getch();
}

```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Matrix Multiplication
*****

Enter the number of rows and columns of the first matrix:
1
1

Enter the elements of first matrix:
Row[1]Column[1]:0

Enter the number of rows and columns of the second matrix
2
2

Matrices are not compatible.
Number of columns of first matrix should equal number of rows of the second one.

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Matrix Multiplication
*****

Enter the number of rows and columns of the first matrix:
2
3

Enter the elements of first matrix:
Row[1]Column[1]:1
Row[1]Column[2]:1
Row[1]Column[3]:0
Row[2]Column[1]:0
Row[2]Column[2]:1
Row[2]Column[3]:0

Enter the number of rows and columns of the second matrix
3
2
```

Enter the elements of second matrix:

Row[1]Column[1]:0

Row[1]Column[2]:0

Row[2]Column[1]:1

Row[2]Column[2]:1

Row[3]Column[1]:0

Row[3]Column[2]:0

The First matrix is:

1 1 0

0 1 0

The Second matrix is:

0 0

1 1

0 0

Product of entered matrices:

1 1

1 1

Robert Kal

Experiment 11

/*Largest of 'n' numbers using functions and array*/

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

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

```
int findmax(int[], int);
```

```
void main()
```

```
{
```

```
    int i, array[100], size, location, maximum;
```

```
    clrscr();
```

```
    printf("Enter number of elements: ");
```

```
    scanf("%d", &size);
```

```
    printf("Enter %d integers\n", size);
```

```
    for(i= 0;i<size;i++)
```

```
        scanf("%d", &array[i]);
```

```
    location=findmax(array, size);
```

```
    maximum=array[location];
```

```
    printf("Maximum element value = %d and location = %d \n", maximum, location+1);
```

```
    getch();
```

```
}
```

```
int findmax(int a[], int n)
```

```
{
```

```
    int i, max, index;
```

```
    max=a[0];
```

```
    index=0;
```

```
    for(i=1;i<n;i++)
```

```
    {
```

```
        if(a[i]>max)
```

```
        {
```

```
            index=i;
```

```
            max=a[i];
```

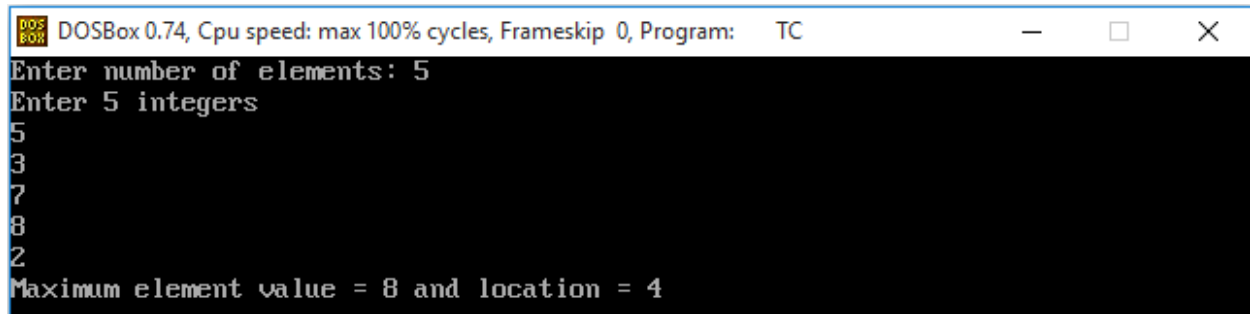
```
        }
```

```
    }
```

```
    return index;
```

```
}
```

Output

A screenshot of a DOSBox window titled "DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC". The window has standard Windows-style window controls (minimize, maximize, close). The main area is black with white text. The text shows a program prompt "Enter number of elements: 5", followed by "Enter 5 integers". Then, five integers are entered on separate lines: 5, 3, 7, 8, and 2. Finally, the program outputs "Maximum element value = 8 and location = 4".

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program:  TC
Enter number of elements: 5
Enter 5 integers
5
3
7
8
2
Maximum element value = 8 and location = 4
```

Experiment 12

/*String Methods*/

#include <stdio.h>

#include <conio.h>

void main()

{

int choice;

char name[20], name2[20], name3[20];

clrscr();

printf("String Manipulations");

printf("\n*****");

while(1)

{

printf("\n1.Length and Uppercase");

printf("\n2.Compare");

printf("\n3.Concatenate and Reverse");

printf("\n4.Palindrome");

printf("\n5.Exit");

printf("\nEnter your choice: ");

scanf("%d", &choice);

switch(choice)

{

case 1:

printf("\nEnter your name:\n");

scanf("%s", &name);

printf("\nLength of your name is : %d", strlen(name));

printf("\nYour name in uppercase is : %s",strupr(name));

break;

case 2:

printf("\nEnter two names:\n");

scanf("%s %s",&name,&name2);

if (strcmp(name,name2) ==0)

{

printf("\nYour two names are the same.");

}

else

{

printf("\nYour two names are different.");

}

break;

case 3:

```
printf("\nEnter two names:\n");
scanf("%s %s",&name,&name2);
strcat(name,name2);
printf("\nConcatenation of your names is : %s", name);
printf("\nReverse of your concatenated names is : %s", strrev(name));
break;
```

case 4:

```
printf("\nEnter your name:\n");
scanf("%s", &name);
if (strcmp(strrev(name),name)==0)
    printf("\nYour name %s is a palindrome",name);
else
    printf("\nYour name %s is not a palindrome",name);
break;
```

case 5:

```
exit(0);
break;
```

default:

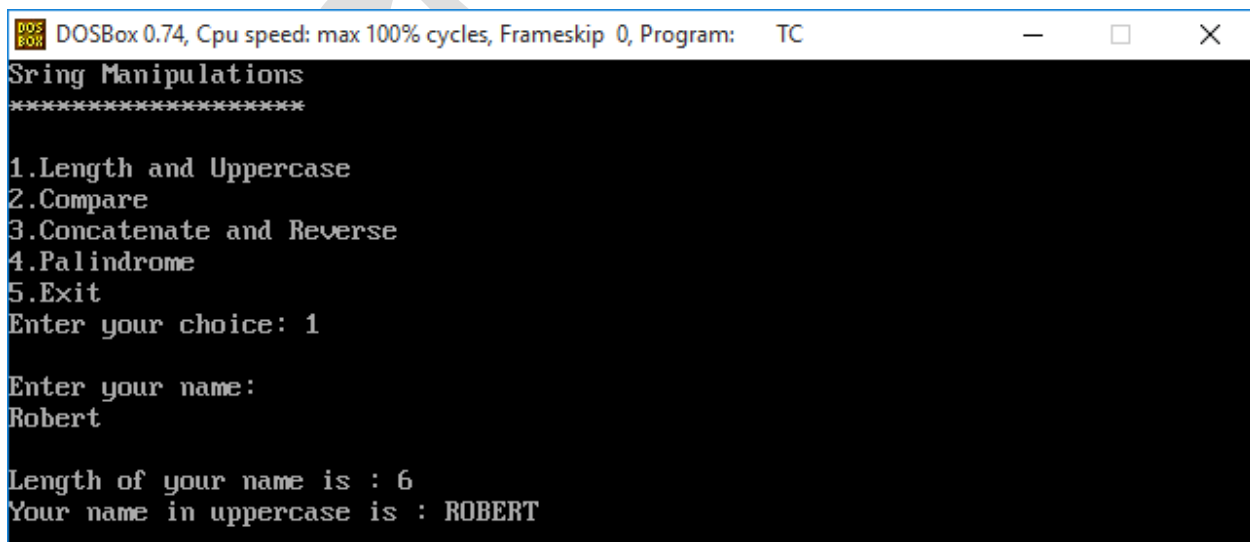
```
printf("Error. Incorrect Choice.");
```

```
}
```

```
}
```

```
}
```

Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
String Manipulations
*****
1.Length and Uppercase
2.Compare
3.Concatenate and Reverse
4.Palindrome
5.Exit
Enter your choice: 1

Enter your name:
Robert

Length of your name is : 6
Your name in uppercase is : ROBERT
```

```
1.Length and Uppercase
2.Compare
3.Concatenate and Reverse
4.Palindrome
5.Exit
```

Enter your choice: 2

Enter two names:

Robert

Karamagi

Your two names are different.

```
1.Length and Uppercase
2.Compare
3.Concatenate and Reverse
4.Palindrome
5.Exit
```

Enter your choice: 3

Enter two names:

Robert

Karamagi

Concatenation of your names is : RobertKaramagi

Reverse of your concatenated names is : igamaraKtreboR

```
1.Length and Uppercase
2.Compare
3.Concatenate and Reverse
4.Palindrome
5.Exit
```

Enter your choice: 4

Enter your name:

Bob

Your name boB is a palindrome

```
1.Length and Uppercase
2.Compare
3.Concatenate and Reverse
4.Palindrome
5.Exit
```

Enter your choice: 5

Experiment 13

/*Student Mark list using structures*/

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

```
struct student
```

```
{
    int id,s1,s2,tot,avg;
    char name[10];
}s[10];
```

```
void main()
```

```
{
    int i, n;
    clrscr();
    printf("Enter the number of students: ");
    scanf("%d", &n);
    for(i =0;i<n;i++)
    {
        printf("\nEnter the student name: ");
        scanf("%s",s[i].name);
        printf("\nEnter the ID number: ");
        scanf("%d", &s[i].id);
        printf("\nEnter the marks in Java and Python: ");
        scanf("%d %d",&s[i].s1, &s[i].s2);
        s[i].tot=s[i].s1+s[i].s2;
        s[i].avg=s[i].tot/2;
    }
    printf("\n\n\t\t\t\t\t Student Mark List");
    printf("\n\n\t\t\t\t\t *****");
    printf("\n\n+-----+-----+-----+-----+-----+-----+");
    printf("\n|Student Name |ID Number |  Java  | Python  | Total  | Average |");
    printf("\n+-----+-----+-----+-----+-----+-----+");
    for(i=0;i<n;i++)
    {
        printf("\n|%10s | %4d | %4d | %4d | %4d | %5d |",
            s[i].name,s[i].id,s[i].s1,s[i].s2,s[i].tot,s[i].avg);
    }
    printf("\n+-----+-----+-----+-----+-----+-----+");
    getch();
}
```

Output

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the number of students: 3
Enter the student name: Robert
Enter the ID number: 201
Enter the marks in Java and Python: 100
100
Enter the student name: Innocent
Enter the ID number: 202
Enter the marks in Java and Python: 100
100
Enter the student name: Karamagi
Enter the ID number: 203
Enter the marks in Java and Python: 100
100

Student Mark List
*****

+-----+-----+-----+-----+-----+-----+
|Student Name |ID Number |   Java   |   Python  |   Total  |   Average |
+-----+-----+-----+-----+-----+-----+
|   Robert   |    201   |    100   |    100    |    200   |    100    |
|   Innocent  |    202   |    100   |    100    |    200   |    100    |
|   Karamagi  |    203   |    100   |    100    |    200   |    100    |
+-----+-----+-----+-----+-----+-----+
```

Experiment 14

/*Area of various shapes using functions*/

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

```
float triangle(float,float);
int rectangle(int,int);
int square(int);
float circle(float);
float cylinder(float,float);
```

```
void main()
{
    int sl,rl,rb;
    float r,tb,th,cr,ch;
    clrscr();
    printf("Enter base and height of triangle: ");
    scanf("%f %f",&tb,&th);
    printf("Enter length and breadth of rectangle: ");
    scanf("%d %d",&rl,&rb);
    printf("Enter side of a square: ");
    scanf("%d",&sl);
    printf("Enter radius of circle: ");
    scanf("%f",&r);
    printf("Enter radius and height of cylinder: ");
    scanf("%f %f",&cr,&ch);

    printf("\nArea Calculations");
    printf("\n*****\n");
    printf("\nArea of triangle is %f ",triangle(tb,th));
    printf("\nArea of rectangle is %d ",rectangle(rl,rb));
    printf("\nArea of square is %d",square(sl));
    printf("\nArea of circle is %f",circle(r));
    printf("\nArea of cylinder is %f",cylinder(cr,ch));
    getch();
}

float triangle(float tb,float th)
{
    return((tb*th)/2);
}
```

```

int rectangle(int rl,int rb)
{
    return(rl*rb);
}

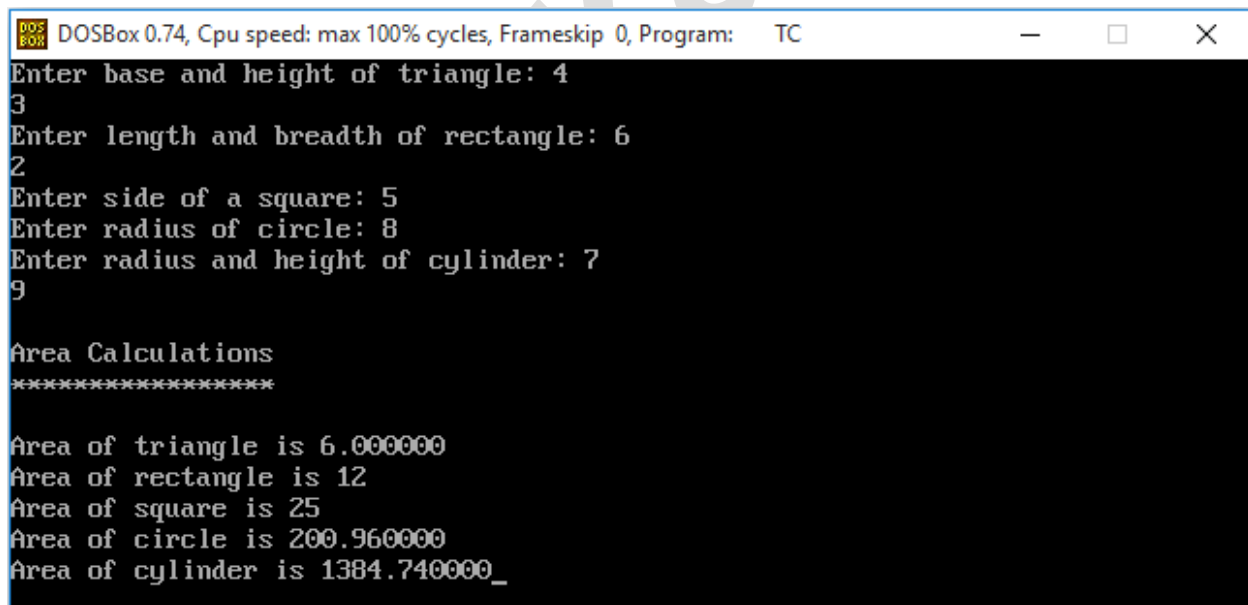
int square(int sl)
{
    return(sl*sl);
}

float circle(float r)
{
    return(3.14*r*r);
}

float cylinder(float cr,float ch)
{
    return(3.14*cr*cr*ch);
}

```

Output



The screenshot shows a DOSBox window titled "DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC". The window contains a black terminal with white text. The program prompts the user to enter dimensions for various shapes. The inputs provided are: base 3 and height 4 for a triangle; length 6 and breadth 2 for a rectangle; side 5 for a square; radius 8 for a circle; and radius 7 and height 9 for a cylinder. After the inputs, the program displays the calculated areas for each shape.

```

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter base and height of triangle: 4
3
Enter length and breadth of rectangle: 6
2
Enter side of a square: 5
Enter radius of circle: 8
Enter radius and height of cylinder: 7
9

Area Calculations
*****

Area of triangle is 6.000000
Area of rectangle is 12
Area of square is 25
Area of circle is 200.960000
Area of cylinder is 1384.740000_

```

Experiment 15

/*Employee Payroll Processing using Structures*/

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

```
struct emp
{
    int empid,sal,stpd,loan,nsal;
    char name[10] ;
}e[10];
```

```
void main()
{
    int i, n;
    struct emp *ptr=e;
    clrscr();
    printf("Enter the number of employees : ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("\nEnter the employee name: ");
        scanf("%s", &(ptr+i)->name);
        printf("\nEnter the ID number: ");
        scanf("%d", &(ptr+i)->empid);
        printf("\nEnter the Salary, Stipend & Loans: ");
        scanf("%d %d %d", &(ptr+i)->sal,&(ptr+i)->stpd,&(ptr+i)->loan) ;
        (ptr+i)->nsal=(ptr+i)->sal + (ptr+i)->stpd - (ptr+i)->loan;
    }
    printf("\n      Employee Payroll Processing");
    printf("\n      *****");
    printf("\n\n+-----+-----+-----+-----+-----+-----+");
    printf("\n|Employee Name| ID Number|  Salary  | Stipend |  Loan  | Net Salary |");
    printf("\n+-----+-----+-----+-----+-----+-----+");
    for(i=0;i<n;i++)
    {
        printf("\n|%10s | %4d | %4d | %4d |%4d | %5d |",
            (ptr+i)->name,(ptr+i)->empid,(ptr+i)->sal,(ptr+i)->stpd,(ptr+i)->loan,(ptr+i)->nsal);
    }
    printf("\n+-----+-----+-----+-----+-----+-----+");
    getch() ;
}
```

Output

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Enter the number of employees : 3

Enter the employee name: Robert

Enter the ID number: 101

Enter the Salary, Stipend & Loans: 28000
2000
0

Enter the employee name: Innocent

Enter the ID number: 102

Enter the Salary, Stipend & Loans: 28500
3000
1500

Enter the employee name: Karamagi

Enter the ID number: 103

Enter the Salary, Stipend & Loans: 32000
500
2500

Employee Payroll Processing
*****

+-----+-----+-----+-----+-----+-----+
|Employee Name| ID Number| Salary | Stipend | Loan | Net Salary |
+-----+-----+-----+-----+-----+-----+
| Robert      | 101      | 28000  | 2000    | 0     | 30000      |
| Innocent    | 102      | 28500  | 3000    | 1500  | 30000      |
| Karamagi    | 103      | 32000  | 500     | 2500  | 30000      |
+-----+-----+-----+-----+-----+-----+
```

Experiment 16

/*Pointers and Arrays*/

#include <stdio.h>

#include <conio.h>

void main()

{

int i,j,temp,*p,n,array[20];

clrscr();

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

scanf("%d",&n);

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

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

{

scanf("%d",&array[i]);

}

p = &array[0];

for(i=0;i<n-1;i++)

{

for(j=i+1;j<n;j++)

{

if(*(p+i)>*(p+j))

{

temp=*(p+i);

(p+i)=(p+j);

*(p+j)=temp;

}

}

}

printf("\n\nThe sorted elements are:\n");

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

{

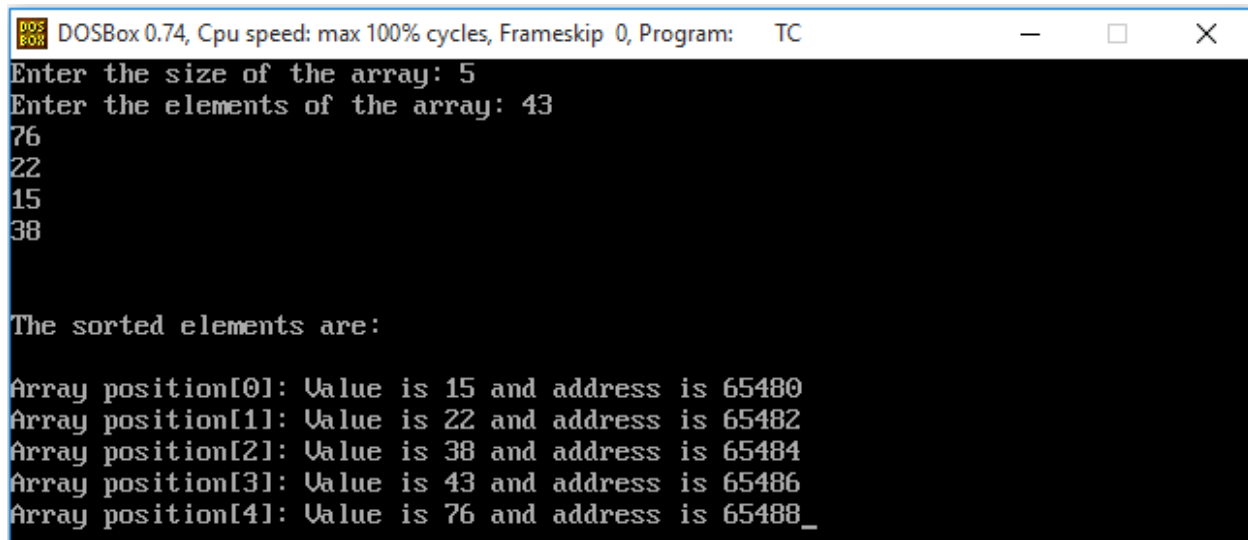
printf("\nArray position[%d]: Value is %d and address is %u",i, *(p+i), p+i);

}

getch();

}

Output

A screenshot of a DOSBox window titled "DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC". The window has standard Windows-style window controls (minimize, maximize, close). The main area is black with white text. The text shows a program running in TC (Turbo C) that prompts for array size and elements, then displays sorted elements with their memory addresses. The input values are 5 for size and 43, 76, 22, 15, 38 for elements. The output shows the sorted array: 15, 22, 38, 43, 76, with their respective addresses starting from 65480.

```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program:  TC
Enter the size of the array: 5
Enter the elements of the array: 43
76
22
15
38

The sorted elements are:

Array position[0]: Value is 15 and address is 65480
Array position[1]: Value is 22 and address is 65482
Array position[2]: Value is 38 and address is 65484
Array position[3]: Value is 43 and address is 65486
Array position[4]: Value is 76 and address is 65488_
```

Experiment 17

```
/*Binary Search*/
```

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

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

```
void main()
```

```
{
```

```
    int i,first,last,middle,n,search,array[100];
```

```
    clrscr();
```

```
    printf("Binary Search\n");
```

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

```
    printf("Enter number of elements\n");
```

```
    scanf("%d",&n);
```

```
    printf("Enter %d integers\n", n);
```

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

```
    {
```

```
        scanf("%d",&array[i]);
```

```
    }
```

```
    printf("Enter value to find\n");
```

```
    scanf("%d",&search);
```

```
    first=0;
```

```
    last=n-1;
```

```
    middle=(first+last)/2;
```

```
    while(first<=last)
```

```
    {
```

```
        if(array[middle]<search)
```

```
            first=middle+1;
```

```
        else if(array[middle]==search)
```

```
        {
```

```
            printf("%d found at location %d.\n", search, middle+1);
```

```
            break;
```

```
        }
```

```
        else
```

```
            last=middle-1;
```

```
            middle=(first+last)/2;
```

```
    }
```

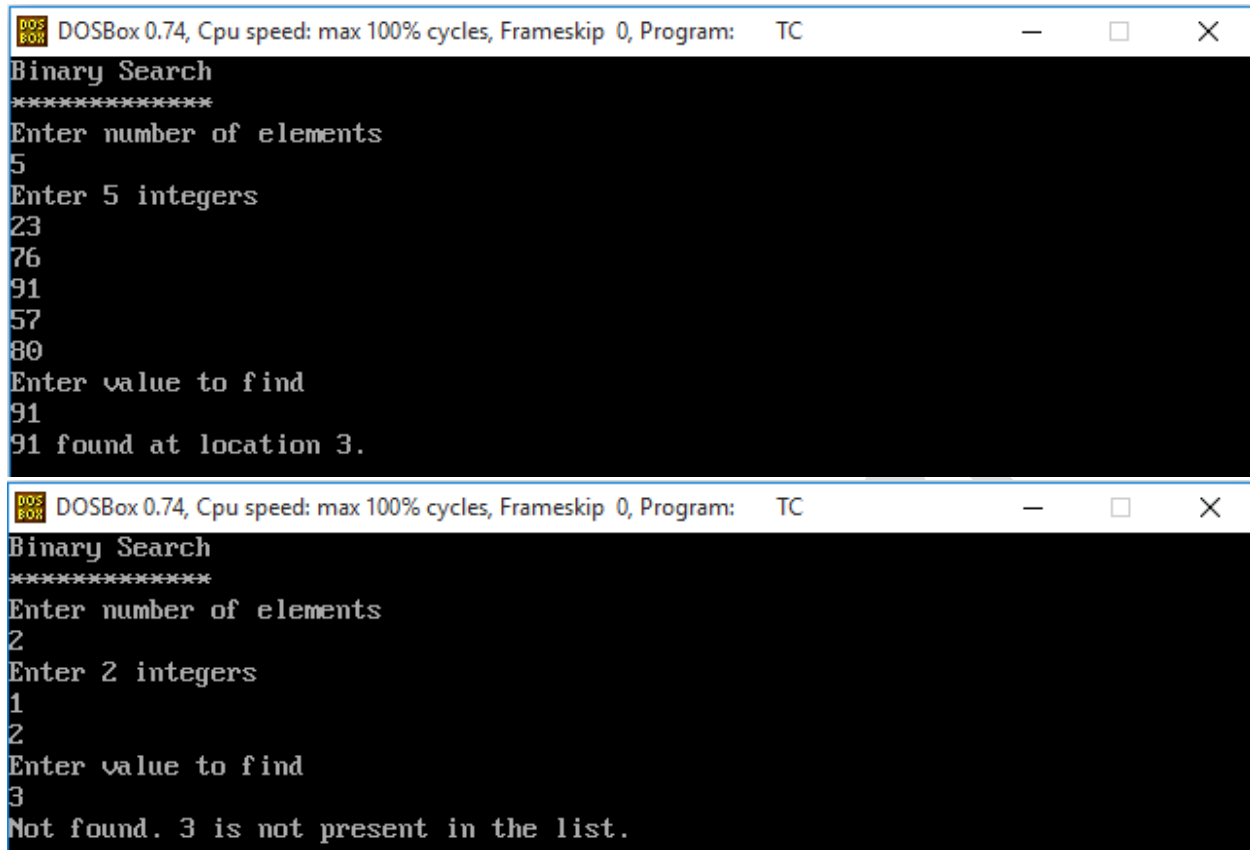
```
    if(first>last)
```

```
        printf("Not found. %d is not present in the list.\n", search);
```

```
    getch();
```

```
}
```

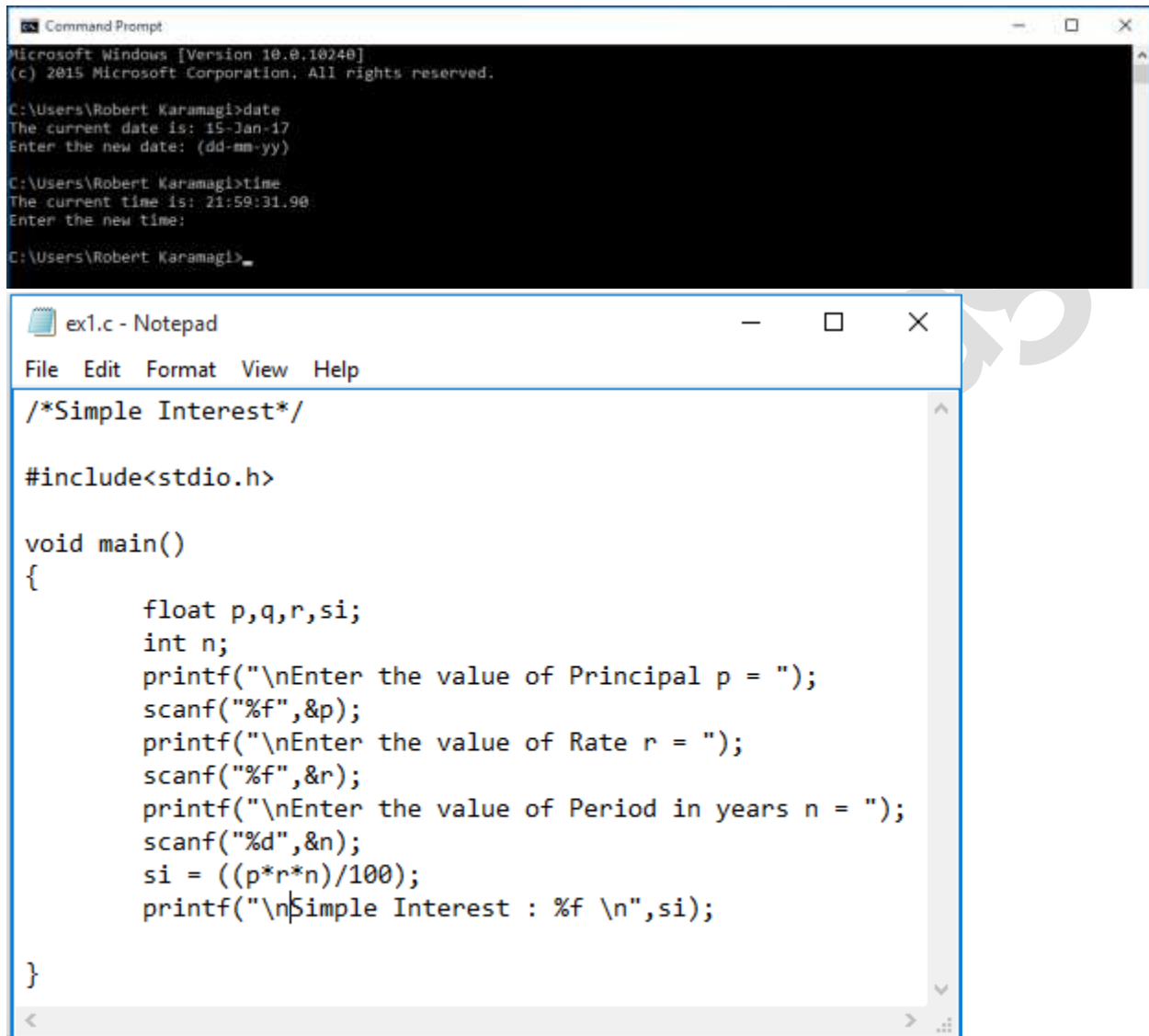
Output



```
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Binary Search
*****
Enter number of elements
5
Enter 5 integers
23
76
91
57
80
Enter value to find
91
91 found at location 3.

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0, Program: TC
Binary Search
*****
Enter number of elements
2
Enter 2 integers
1
2
Enter value to find
3
Not found. 3 is not present in the list.
```

Experiment 1 Example using Command Prompt and MinGW GCC compiler



The image shows two overlapping windows from a Windows operating system. The top window is a Command Prompt titled "Command Prompt" with a black background and white text. It displays the Windows version (10.0.10240) and copyright information (© 2015 Microsoft Corporation). The user has entered the command 'date', which shows the current date as 15-Jan-17, and then 'time', which shows the current time as 21:59:31.98. The bottom window is a Notepad application titled "ex1.c - Notepad" with a white background and black text. It contains a C program for calculating Simple Interest. The code includes the standard input/output header, defines the main function, and uses printf and scanf to interact with the user, calculating the simple interest based on principal, rate, and period.

```
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Robert Karamagi>date
The current date is: 15-Jan-17
Enter the new date: (dd-mm-yy)

C:\Users\Robert Karamagi>time
The current time is: 21:59:31.98
Enter the new time:

C:\Users\Robert Karamagi>
```

```
ex1.c - Notepad
File Edit Format View Help

/*Simple Interest*/

#include<stdio.h>

void main()
{
    float p,q,r,si;
    int n;
    printf("\nEnter the value of Principal p = ");
    scanf("%f",&p);
    printf("\nEnter the value of Rate r = ");
    scanf("%f",&r);
    printf("\nEnter the value of Period in years n = ");
    scanf("%d",&n);
    si = ((p*r*n)/100);
    printf("\nSimple Interest : %f \n",si);
}
```

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd..
C:\Windows>cd..
C:\>cd users
C:\Users>cd robert karamagi
C:\Users\Robert Karamagi>cd c
C:\Users\Robert Karamagi\C>gcc -o ex1 ex1.c
C:\Users\Robert Karamagi\C>ex1
Enter the value of Principal p = 5000.
Enter the value of Rate r = 2.37
Enter the value of Period in years n = 6
Simple Interest : 710.999939
C:\Users\Robert Karamagi\C>
```