```
                    /* Program for Trapezoidal rule*/

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

void main()
{
    int i,n;
    float a,b,h,x[50],y[50],s1=0.0,s2=0.0,I;

    FILE *fp;
    fp=fopen("trap.o","a");
    clrscr();

    fprintf(fp,"\n\n OUTPUT");
    printf("\n Enter value of a, b & n:\t ");
    scanf("%f%f%d",&a,&b,&n);
    fprintf(fp,"\nEnter the values of a b & n: %f %f %d",a,b,n);

    h=(b-a)/n;

    printf("\n\n The value of h:%f \n",h);
    fprintf(fp,"\n\n The value of h:%f \n",h);

    for(i=0;i<=n;i++)
    {
    x[i]=a+(i*h);
    y[i]=1/(1+(x[i]*x[i]));
    printf("\n x[%d]=%f\t y[%d]=%f",i,x[i],i,y[i]);
    fprintf(fp,"\n x[%d]=%f\t y[%d]=%f",i,x[i],i,y[i]);
    if(i==0||i==(n))
        s1+=y[i];
    else
        s2+=(2*y[i]);
    }


    I=(h/2)*(s1+s2);

    printf("\n\n The integral value I=%f",I);
    fprintf(fp,"\n\n The integral value I=%f",I);

    fprintf(fp,"\n----------------------------------------------");
    getch();
}
```

```
                    /* Output for Trapezoidal Rule */

 OUTPUT
 Enter the values of a b & n: 0.000000 6.000000 6

 The value of h:1.000000

 x[0]=0.000000 y[0]=1.000000
 x[1]=1.000000 y[1]=0.500000
 x[2]=2.000000 y[2]=0.200000
 x[3]=3.000000 y[3]=0.100000
 x[4]=4.000000 y[4]=0.058824
 x[5]=5.000000 y[5]=0.038462
 x[6]=6.000000 y[6]=0.027027

 The integral value I=1.410799
---------------------------------------------------------

 OUTPUT
 Enter the values of a b & n: 0.200000 0.800000 6

 The value of h:0.100000

 x[0]=0.200000 y[0]=1.221403
 x[1]=0.300000 y[1]=1.349859
 x[2]=0.400000 y[2]=1.491825
 x[3]=0.500000 y[3]=1.648721
 x[4]=0.600000 y[4]=1.822119
 x[5]=0.700000 y[5]=2.013753
 x[6]=0.800000 y[6]=2.225541

 The integral value I=1.004975
---------------------------------------------------------

 OUTPUT
 Enter the values of a b & n: 0.000000 1.570000 6

 The value of h:0.261667

 x[0]=0.000000 y[0]=0.000000
 x[1]=0.261667 y[1]=0.258691
 x[2]=0.523333 y[2]=0.499770
 x[3]=0.785000 y[3]=0.706825
 x[4]=1.046667 y[4]=0.865760
 x[5]=1.308333 y[5]=0.965754
 x[6]=1.570000 y[6]=1.000000

 The integral value I=0.993496
---------------------------------------------------------
```

```
                    /*Program for Simpson 1/3 rule */

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

void main()
{
    int i,n;
    float a,b,h,x[50],y[50],s1=0.0,s2=0.0,s3=0.0,I;

    FILE *fp;
    fp=fopen("sim13.o","a");
    clrscr();

    fprintf(fp,"\n\n OUTPUT");
    printf("\n Enter value of a, b & n:\t ");
    scanf("%f%f%d",&a,&b,&n);
    fprintf(fp,"\n Enter the values of a b & n: %f %f %d",a,b,n);
    h=(b-a)/(2*n);
    printf("\n\n The value of h:%f \n",h);
    fprintf(fp,"\n\n The value of h:%f \n",h);

    for(i=0;i<=(2*n);i++)
    {

    x[i]=a+(i*h);
    y[i]=exp(x[i]);

    printf("\n x[%d]=%f\t y[%d]=%f",i,x[i],i,y[i]);
    fprintf(fp,"\n x[%d]=%f\t y[%d]=%f",i,x[i],i,y[i]);

    if(i==0||i==(2*n))
        s1+=y[i];
    else if(i%2==0)
        s2+=(2*y[i]);
    else
        s3+=(4*y[i]);
    }

    I=(h/3)*(s1+s2+s3);

    printf("\n\n The integral value I=%f",I);
    fprintf(fp,"\n\n The integral value I=%f",I);

    fprintf(fp,"\n--------------------------------------------------");
    getch();
}
```

```
                   /*Output for Simpson 1/3 rule */


 OUTPUT
 Enter the values of a b & n: 0.000000 6.000000 6

 The value of h:0.500000

 x[0]=0.000000    y[0]=1.000000
 x[1]=0.500000    y[1]=0.800000
 x[2]=1.000000    y[2]=0.500000
 x[3]=1.500000    y[3]=0.307692
 x[4]=2.000000    y[4]=0.200000
 x[5]=2.500000    y[5]=0.137931
 x[6]=3.000000    y[6]=0.100000
 x[7]=3.500000    y[7]=0.075472
 x[8]=4.000000    y[8]=0.058824
 x[9]=4.500000    y[9]=0.047059
 x[10]=5.000000   y[10]=0.038462
 x[11]=5.500000   y[11]=0.032000
 x[12]=6.000000   y[12]=0.027027

 The integral value I=1.403702
------------------------------------------------------------

 OUTPUT
 Enter the values of a b & n: 0.200000 0.800000 6

 The value of h:0.050000

 x[0]=0.200000    y[0]=1.221403
 x[1]=0.250000    y[1]=1.284025
 x[2]=0.300000    y[2]=1.349859
 x[3]=0.350000    y[3]=1.419068
 x[4]=0.400000    y[4]=1.491825
 x[5]=0.450000    y[5]=1.568312
 x[6]=0.500000    y[6]=1.648721
 x[7]=0.550000    y[7]=1.733253
 x[8]=0.600000    y[8]=1.822119
 x[9]=0.650000    y[9]=1.915541
 x[10]=0.700000   y[10]=2.013753
 x[11]=0.750000   y[11]=2.117000
 x[12]=0.800000   y[12]=2.225541

 The integral value I=1.004138
------------------------------------------------------------
```

```
                    /*Output for Simpson 1/3 rule */
```

```
OUTPUT
 Enter the values of a b & n: 0.000000 1.570000 6

 The value of h:0.130833

 x[0]=0.000000    y[0]=0.000000
 x[1]=0.130833    y[1]=0.130460
 x[2]=0.261667    y[2]=0.258691
 x[3]=0.392500    y[3]=0.382500
 x[4]=0.523333    y[4]=0.499770
 x[5]=0.654167    y[5]=0.608498
 x[6]=0.785000    y[6]=0.706825
 x[7]=0.915833    y[7]=0.793070
 x[8]=1.046667    y[8]=0.865760
 x[9]=1.177500    y[9]=0.923651
 x[10]=1.308333   y[10]=0.965754
 x[11]=1.439167   y[11]=0.991349
 x[12]=1.570000   y[12]=1.000000

 The integral value I=0.999205
------------------------------------------------------------
```

```
                    /*Program for Simpson 3/8 rule */

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

void main()
{
   int i,n;
   float a,b,h,x[50],y[50],s1=0.0,s2=0.0,s3=0.0,I;

   FILE *fp;
   fp=fopen("sim38.o","a");
   clrscr();

   fprintf(fp,"\n\n OUTPUT");
   printf("\n\n Enter value of a, b & n:\t ");
   scanf("%f%f%d",&a,&b,&n);
   fprintf(fp,"\n\n Enter the values of a b & n: %f %f %d",a,b,n);

   h=(b-a)/(3*n);

   printf("\n\n The value of h:%f \n",h);
   fprintf(fp,"\n\n The value of h:%f \n",h);

   for(i=0;i<=(3*n);i++)
   {
   x[i]=a+(i*h);
   y[i]=sin(x[i]);

   printf("\n x[%d]=%f\t y[%d]=%f",i,x[i],i,y[i]);
   fprintf(fp,"\n x[%d]=%f\t y[%d]=%f",i,x[i],i,y[i]);

   if(i==0||i==(3*n))
   {
     s1+=y[i];
   }
   else if(i%3==0)
   {
     s2+=(2*y[i]);
   }
   else
   {
     s3+=(3*y[i]);
   }
   }

   I=((3*h)/8)*(s1+s2+s3);

   printf("\n\n The integral value I=%f",I);
   fprintf(fp,"\n\n The integral value I=%f",I);

   fprintf(fp,"\n--------------------------------------------------");
   getch();
}
```

```
                    /*Output for Simpson 3/8 rule */

 OUTPUT
 Enter the values of a b & n: 0.000000 6.000000 6

 The value of h:0.333333

 x[0]=0.000000     y[0]=1.000000
 x[1]=0.333333     y[1]=0.900000
 x[2]=0.666667     y[2]=0.692308
 x[3]=1.000000     y[3]=0.500000
 x[4]=1.333333     y[4]=0.360000
 x[5]=1.666667     y[5]=0.264706
 x[6]=2.000000     y[6]=0.200000
 x[7]=2.333333     y[7]=0.155172
 x[8]=2.666667     y[8]=0.123288
 x[9]=3.000000     y[9]=0.100000
 x[10]=3.333333    y[10]=0.082569
 x[11]=3.666667    y[11]=0.069231
 x[12]=4.000000    y[12]=0.058824
 x[13]=4.333333    y[13]=0.050562
 x[14]=4.666667    y[14]=0.043902
 x[15]=5.000000    y[15]=0.038462
 x[16]=5.333333    y[16]=0.033962
 x[17]=5.666667    y[17]=0.030201
 x[18]=6.000000    y[18]=0.027027

 The integral value I=1.404912
-----------------------------------------------------

 OUTPUT
 Enter the values of a b & n: 0.200000 0.800000 6

 The value of h:0.033333

 x[0]=0.200000     y[0]=1.221403
 x[1]=0.233333     y[1]=1.262802
 x[2]=0.266667     y[2]=1.305605
 x[3]=0.300000     y[3]=1.349859
 x[4]=0.333333     y[4]=1.395612
 x[5]=0.366667     y[5]=1.442917
 x[6]=0.400000     y[6]=1.491825
 x[7]=0.433333     y[7]=1.542390
 x[8]=0.466667     y[8]=1.594670
 x[9]=0.500000     y[9]=1.648721
 x[10]=0.533333    y[10]=1.704605
 x[11]=0.566667    y[11]=1.762383
 x[12]=0.600000    y[12]=1.822119
 x[13]=0.633333    y[13]=1.883880
 x[14]=0.666667    y[14]=1.947734
 x[15]=0.700000    y[15]=2.013753
 x[16]=0.733333    y[16]=2.082009
 x[17]=0.766667    y[17]=2.152579
 x[18]=0.800000    y[18]=2.225541

 The integral value I=1.004138
-----------------------------------------------------
```

```
                    /*Output for Simpson 3/8 rule */

OUTPUT
Enter the values of a b & n: 0.000000 1.570000 6

The value of h:0.087222

x[0]=0.000000    y[0]=0.000000
x[1]=0.087222    y[1]=0.087112
x[2]=0.174444    y[2]=0.173561
x[3]=0.261667    y[3]=0.258691
x[4]=0.348889    y[4]=0.341854
x[5]=0.436111    y[5]=0.422418
x[6]=0.523333    y[6]=0.499770
x[7]=0.610556    y[7]=0.573323
x[8]=0.697778    y[8]=0.642516
x[9]=0.785000    y[9]=0.706825
x[10]=0.872222   y[10]=0.765760
x[11]=0.959444   y[11]=0.818873
x[12]=1.046667   y[12]=0.865760
x[13]=1.133889   y[13]=0.906065
x[14]=1.221111   y[14]=0.939481
x[15]=1.308333   y[15]=0.965754
x[16]=1.395556   y[16]=0.984685
x[17]=1.482778   y[17]=0.996129
x[18]=1.570000   y[18]=1.000000

The integral value I=0.999204
-----------------------------------------------------
```

```
                 /* Program for Simple Euler's Method*/

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

float fn(float x, float y)
{
   float z;
   z=x+y;
   return(z);
}

void main()
{
   float x,y,h;
   FILE *fp;
   fp=fopen("simeuler.o","a");
   clrscr();

   fprintf(fp,"\nOUTPUT");
   printf("\nEnter the values of x, y and h\t");
   scanf("%f%f%f",&x,&y,&h);
   fprintf(fp,"\nEnter the values of x, y and h\t %f  %f  %f",x,y,h);

   do
   {
   y+=h*fn(x,y);
   x+=h;
   printf("\nThe value of x=%f \t y=%f",x,y);
   fprintf(fp,"\nThe value of x=%f \t y=%f",x,y);
   }

   while(x<=0.2);
   fprintf(fp,"\n---------------------------------------------------");
   fclose(fp);
   getch();
}
```

```
                  /* Output for Simple Euler’s Method*/

OUTPUT
Enter the values of x, y and h  0.000000  1.000000  0.050000
The value of x=0.050000  y=1.050000
The value of x=0.100000  y=1.105000
The value of x=0.150000  y=1.165250
The value of x=0.200000  y=1.231012
-------------------------------------------------------

OUTPUT
Enter the values of x, y and h  0.000000  1.000000  0.050000
The value of x=0.050000  y=1.000000
The value of x=0.100000  y=1.000250
The value of x=0.150000  y=1.001250
The value of x=0.200000  y=1.003503
-------------------------------------------------------


OUTPUT
Enter the values of x, y and h  0.000000  0.000000  0.100000
The value of x=0.100000  y=0.100000
The value of x=0.200000  y=0.190000
The value of x=0.300000  y=0.271000
----------------------------------------------------------
```

```
                /* Program for Improved Euler's Method*/

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

float fn(float x, float y)
{
   float z;
   x=1.0;
   z=x-y;
   return(z);
}

void main()
{
   float x,y,h;
   FILE *fp;
   fp=fopen("impeul.o","a");
    clrscr();

   fprintf(fp,"\nOUTPUT");
   printf("\nEnter the values of x, y and h\t");
   scanf("%f%f%f",&x,&y,&h);
   fprintf(fp,"\nEnter the values of x, y and h\t %f  %f  %f",x,y,h);

   do
   {
   y+=(h/2)*(fn(x,y)+fn(x+h,y+h*fn(x,y)));
   x+=h;
   printf("\nThe value of x=%f \t y=%f",x,y);
   fprintf(fp,"\nThe value of x=%f \t y=%f",x,y);
   }

   while(x<=0.3);
   fprintf(fp,"\n---------------------------------------------------");
   fclose(fp);
   getch();
}
```

/* Output for Improved Euler's Method*/

```
OUTPUT
Enter the values of x, y and h  0.000000  1.000000  0.050000
The value of x=0.050000  y=1.052500
The value of x=0.100000  y=1.110253
The value of x=0.150000  y=1.173529
The value of x=0.200000  y=1.242609
-------------------------------------------------------------------

OUTPUT
Enter the values of x, y and h  0.000000  1.000000  0.050000
The value of x=0.050000  y=1.000125
The value of x=0.100000  y=1.000750
The value of x=0.150000  y=1.002378
The value of x=0.200000  y=1.005515
-------------------------------------------------------------------

OUTPUT
Enter the values of x, y and h  0.000000  0.000000  0.100000
The value of x=0.100000  y=0.095000
The value of x=0.200000  y=0.180975
The value of x=0.300000  y=0.258782
-------------------------------------------------------------------
```

```
                /* Program for Modified Euler's Method*/

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

float fn(float x, float y)
{
   float z;
   z=2*x*x*y;
   return(z);
}

void main()
{
   float x,y,h;
   FILE *fp;
   fp=fopen("modeul.o","a");
   clrscr();

   fprintf(fp,"\nOUTPUT");
   printf("\nEnter the values of x, y and h\t");
   scanf("%f%f%f",&x,&y,&h);
   fprintf(fp,"\nEnter the values of x, y and h\t %f  %f  %f",x,y,h);

   do
   {
   y+=h*(fn((x+(h/2)),y+((h/2)*fn(x,y))));
   x+=h;
   printf("\nThe value of x=%f \t y=%f",x,y);
   fprintf(fp,"\nThe value of x=%f \t y=%f",x,y);
   }

   while(x<=0.2);
   fprintf(fp,"\n---------------------------------------------------");
   fclose(fp);
   getch();
}
```

```
                /* Output for Modified Euler's Method*/

OUTPUT
Enter the values of x, y and h  0.000000  1.000000  0.050000
The value of x=0.050000  y=1.052500
The value of x=0.100000  y=1.110253
The value of x=0.150000  y=1.173529
The value of x=0.200000  y=1.242609
-------------------------------------------------------------------

OUTPUT
Enter the values of x, y and h  0.000000  1.000000  0.050000
The value of x=0.050000  y=1.000062
The value of x=0.100000  y=1.000625
The value of x=0.150000  y=1.002189
The value of x=0.200000  y=1.005262
-------------------------------------------------------------------

OUTPUT
Enter the values of x, y and h  0.000000  0.000000  0.100000
The value of x=0.100000  y=0.095000
The value of x=0.200000  y=0.180975
The value of x=0.300000  y=0.258782
-------------------------------------------------------------------
```

```
                 /* Program for Runge Kutta II Method */

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

float fn(float x, float y)
{
    float z;
    z=2*x*x*y;
    return(z);
}

void main()
{
    float x,y,h,k,k1,k2;
    FILE *fp;
    fp=fopen("rk2.o","a");
    fprintf(fp,"\n\n OUTPUT");
    clrscr();

    printf("\n\n Enter the values of x, y and h:");
    scanf("%f%f%f",&x,&y,&h);
    fprintf(fp,"\n\n Enter the values of x, y and h: %f\t%f\t%f",x,y,h);

    do
    {
    k1=h*fn(x,y);
    k2=h*fn(x+h,y+k1);
    k=(k1+k2)/2;
    x+=h;
    y+=k;

    printf("\nThe value of k1=%f\t k2=%f\t k=%f",k1,k2,k);
    fprintf(fp,"\nThe value of k1=%f\t k2=%f\t k=%f",k1,k2,k);
    printf("\nThe value of x=%f\t y=%f",x,y);
    fprintf(fp,"\nThe value of x=%f\t y=%f",x,y);
    }

    while(x<=0.2);
    fprintf(fp,"\n--------------------------------------------------");
    fclose(fp);
    getch();
}
```

/* Output for Runge Kutta II Method */

```
OUTPUT

Enter the values of x, y and h: 0.000000  1.000000   0.050000
The value of k1=0.050000 k2=0.055000   k=0.052500
The value of x=0.050000  y=1.052500
The value of k1=0.055125 k2=0.060381   k=0.057753
The value of x=0.100000  y=1.110253
The value of k1=0.060513 k2=0.066038   k=0.063275
The value of x=0.150000  y=1.173529
The value of k1=0.066176 k2=0.071985   k=0.069081
The value of x=0.200000  y=1.242609
-----------------------------------------------------------

OUTPUT

Enter the values of x, y and h: 0.000000  1.000000   0.050000
The value of k1=0.000000 k2=0.000250   k=0.000125
The value of x=0.050000  y=1.000125
The value of k1=0.000250 k2=0.001000   k=0.000625
The value of x=0.100000  y=1.000750
The value of k1=0.001001 k2=0.002254   k=0.001627
The value of x=0.150000  y=1.002378
The value of k1=0.002255 k2=0.004019   k=0.003137
The value of x=0.200000  y=1.005515
-----------------------------------------------------------

 OUTPUT

 Enter the values of x, y and h: 0.000000 0.000000   0.100000
The value of k1=0.100000 k2=0.090000   k=0.095000
The value of x=0.100000  y=0.095000
The value of k1=0.090500 k2=0.081450   k=0.085975
The value of x=0.200000  y=0.180975
The value of k1=0.081903 k2=0.073712   k=0.077807
The value of x=0.300000  y=0.258782
-----------------------------------------------------------
```

```
                 /* Program for Runge Kutta IV Method */

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

float fn(float x, float y)
{
    float z;
    x=1.0;
    z=x-y;
    return(z);
}

void main()
{
    float x,y,h,k,k1,k2,k3,k4;
    FILE *fp;
    fp=fopen("rk4.o","a");
    fprintf(fp,"\nOUTPUT");
    clrscr();

    printf("\nEnter the values of x, y and h:");
    scanf("%f%f%f",&x,&y,&h);
    fprintf(fp,"\nEnter the values of x, y and h: %f\t%f\t%f",x,y,h);

    do
    {
    k1=h*fn(x,y);
    k2=h*fn(x+(h/2),y+(k1/2));
    k3=h*fn(x+(h/2),y+(k2/2));
    k4=h*fn(x+h,y+k3);
    k=(k1+2*(k2+k3)+k4)/6;
    x+=h;
    y+=k;

    printf("\nThe value of k1=%f\t k2=%f\t k3=%f\t k4=%f",k1,k2,k3,k4);
    fprintf(fp,"\nThe value of k1=%f\t k2=%f\t k3=%f\t k4=%f",k1,k2,k3,k4);
    printf("\nThe value of k=%f\t x=%f\t y=%f",k,x,y);
    fprintf(fp,"\nThe value of k=%f\t x=%f\t y=%f",k,x,y);
    }

    while(x<=0.3);
    fprintf(fp,"\n-------------------------------------------------");
    fclose(fp);
    getch();
}
```

```
                 /* Output for Runge Kutta IV Method */

OUTPUT
Enter the values of x, y and h: 0.000000  1.000000   0.050000
The value of k1=0.050000 k2=0.052500   k3=0.052563   k4=0.055128
The value of k=0.052542  x=0.050000    y=1.052542
The value of k1=0.055127 k2=0.057755   k3=0.057821   k4=0.060518
The value of k=0.057800  x=0.100000    y=1.110342
The value of k1=0.060517 k2=0.063280   k3=0.063349   k4=0.066185
The value of k=0.063327  x=0.150000    y=1.173669
The value of k1=0.066183 k2=0.069088   k3=0.069161   k4=0.072141
The value of k=0.069137  x=0.200000    y=1.242805
--------------------------------------------------------------

OUTPUT
Enter the values of x, y and h: 0.000000  1.000000   0.050000
The value of k1=0.000000 k2=0.000063   k3=0.000063   k4=0.000250
The value of k=0.000083  x=0.050000    y=1.000083
The value of k1=0.000250 k2=0.000563   k3=0.000563   k4=0.001001
The value of k=0.000584  x=0.100000    y=1.000667
The value of k1=0.001001 k2=0.001564   k3=0.001565   k4=0.002255
The value of k=0.001586  x=0.150000    y=1.002252
The value of k1=0.002255 k2=0.003073   k3=0.003074   k4=0.004021
The value of k=0.003095  x=0.200000    y=1.005347
--------------------------------------------------------------

OUTPUT
Enter the values of x, y and h: 0.000000  0.000000   0.100000
The value of k1=0.100000 k2=0.095000   k3=0.095250   k4=0.090475
The value of k=0.095163  x=0.100000    y=0.095163
The value of k1=0.090484 k2=0.085960   k3=0.086186   k4=0.081865
The value of k=0.086107  x=0.200000    y=0.181269
The value of k1=0.081873 k2=0.077779   k3=0.077984   k4=0.074075
The value of k=0.077912  x=0.300000    y=0.259182
--------------------------------------------------------------
```

```
              /* Fit a straight line of the form y=ax+b */

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

void main()
{
    int i,n;
    float x[50],y[50],a,b=1.0,sx=0.0,sy=0.0,sx2=0.0,sxy=0.0;

    FILE *fp;
    fp=fopen("fit1.o","a");
    clrscr();

    fprintf(fp,"\n OUTPUT");
    printf("\n\n Enter the value of n: ");
    scanf("%d",&n);
    fprintf(fp,"\n\n The value of n = %d",n);

    for(i=0;i<n;i++)
    {
    printf("\n Enter the value of x and y: ");
    scanf("%f%f",&x[i],&y[i]);
    fprintf(fp,"\n The value of x[%d]=%f \t y[%d]=%f",i,x[i],i,y[i]);
    }

    for(i=0;i<n;i++)
    {
    sx+=x[i];
    sy+=y[i];
    sxy+=x[i]*y[i];
    sx2+=x[i]*x[i];
    }

    for(i=0;i<=500;i++)
    {
    a=(sxy-(b*sx))/sx2;
    b=(sy-(a*sx))/n;
    }

    printf("\n\n The value of y=%f*x+%f",a,b);
    fprintf(fp,"\n\n The value of y=%f*x+%f",a,b);

    fprintf(fp,"\n------------------------------------------------");
    getch();
}
```

```
      /* Output for fitting a  straight line of the form y=ax+b */

 OUTPUT

 The value of n = 5
 The value of x[0]=1.000000  y[0]=14.000000
 The value of x[1]=2.000000  y[1]=27.000000
 The value of x[2]=3.000000  y[2]=40.000000
 The value of x[3]=4.000000  y[3]=55.000000
 The value of x[4]=5.000000  y[4]=68.000000

 The value of y=13.599998*x+0.000007
-------------------------------------------------
 OUTPUT

 The value of n = 4
 The value of x[0]=2.000000  y[0]=10.000000
 The value of x[1]=4.000000  y[1]=16.000000
 The value of x[2]=6.000000  y[2]=22.000000
 The value of x[3]=8.000000  y[3]=28.000000

 The value of y=3.000000*x+3.999998
-------------------------------------------------
 OUTPUT

 The value of n = 5
 The value of x[0]=0.000000  y[0]=800.299988
 The value of x[1]=1.000000  y[1]=800.400024
 The value of x[2]=2.000000  y[2]=800.599976
 The value of x[3]=3.000000  y[3]=800.700012
 The value of x[4]=4.000000  y[4]=800.900024

 The value of y=0.150061*x+800.279846
-------------------------------------------------
```

```
                /* Fit a curve of the form y=a*e^(bx) */

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

void main()
{
    int i,n;
    float x[50],y[50],A=1.0,a=1.0,b=1.0,sx=0.0,sY=0.0,sx2=0.0,sxY=0.0;

    FILE *fp;
    fp=fopen("fit2.o","a");
    clrscr();

    fprintf(fp,"\n OUTPUT");
    printf("\n\n Enter the value of n: ");
    scanf("%d",&n);
    fprintf(fp,"\n\n The value of n = %d",n);

    for(i=0;i<n;i++)
    {
    printf("\n Enter the value of x and y: ");
    scanf("%f%f",&x[i],&y[i]);
    fprintf(fp,"\n The value of x[%d]=%f \t y[%d]=%f",i,x[i],i,y[i]);
    }

    for(i=0;i<n;i++)
    {
    sx+=x[i];
    sY+=log(y[i]);
    sxY+=x[i]*log(y[i]);
    sx2+=x[i]*x[i];
    }

    for(i=0;i<=500;i++)
    {
    A=(sY-(b*sx))/n;
    b=(sxY-(A*sx))/sx2;
    a=exp(A);
    }

    printf("\n\n The value of y=%f*e^(%f*x)",a,b);
    fprintf(fp,"\n\n The value of y=%f*e^(%f*x)",a,b);

    fprintf(fp,"\n---------------------------------------------------");
    getch();
}
```

```
        /* Output for fitting a curve of the form y=a*e^(bx) */

 OUTPUT

 The value of n = 4
 The value of x[0]=0.100000  y[0]=1.220000
 The value of x[1]=0.200000  y[1]=1.490000
 The value of x[2]=0.300000  y[2]=1.820000
 The value of x[3]=0.400000  y[3]=2.230000

 The value of y=0.997242*e^(2.009512*x)
-----------------------------------------------
 OUTPUT

 The value of n = 5
 The value of x[0]=1.000000  y[0]=10.000000
 The value of x[1]=5.000000  y[1]=12.000000
 The value of x[2]=7.000000  y[2]=15.000000
 The value of x[3]=9.000000  y[3]=17.000000
 The value of x[4]=12.000000    y[4]=21.000000

 The value of y=9.046466*e^(0.069453*x)
-----------------------------------------------
 OUTPUT

 The value of n = 4
 The value of x[0]=1.000000  y[0]=1.650000
 The value of x[1]=2.000000  y[1]=2.700000
 The value of x[2]=3.000000  y[2]=4.500000
 The value of x[3]=4.000000  y[3]=7.350000

 The value of y=1.000050*e^(0.499260*x)
-----------------------------------------------
```

```
                  /* Fit a curve of the form y=ax^b */

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

void main()
{
   int i,n;
   float x[50],y[50],a=1.0,b=1.0,A=1.0,sX=0.0,sY=0.0,sX2=0.0,sXY=0.0;

   FILE *fp;
   fp=fopen("fit3.o","a");
   clrscr();

   fprintf(fp,"\n OUTPUT");
   printf("\n\n Enter the value of n: ");
   scanf("%d",&n);
   fprintf(fp,"\n\n The value of n = %d",n);

   for(i=0;i<n;i++)
   {
   printf("\n Enter the value of x and y: ");
   scanf("%f%f",&x[i],&y[i]);
   fprintf(fp,"\n The value of x[%d]=%f \t y[%d]=%f",i,x[i],i,y[i]);
   }

   for(i=0;i<n;i++)
   {
   sX+=log(x[i]);
   sY+=log(y[i]);
   sXY+=log(x[i])*log(y[i]);
   sX2+=log(x[i])*log(x[i]);
   }

   for(i=0;i<=500;i++)
   {
   A=(sY-(b*sX))/n;
   b=(sXY-(A*sX))/sX2;
   a=exp(A);
   }

   printf("\n\n The value of y=%f*x^%f",a,b);
   fprintf(fp,"\n\n The value of y=%f*x^%f",a,b);

   fprintf(fp,"\n-------------------------------------------------");
   getch();
}
```

```
          /* Output for fitting a curve of the form y=ax^b */


 OUTPUT

 The value of n = 4
 The value of x[0]=0.100000  y[0]=1.220000
 The value of x[1]=0.200000  y[1]=1.490000
 The value of x[2]=0.300000  y[2]=1.820000
 The value of x[3]=0.400000  y[3]=2.230000

 The value of y=3.117683*x^0.422708
-----------------------------------------------
 OUTPUT

 The value of n = 5
 The value of x[0]=1.000000  y[0]=7.000000
 The value of x[1]=2.000000  y[1]=27.000000
 The value of x[2]=3.000000  y[2]=62.000000
 The value of x[3]=4.000000  y[3]=110.000000
 The value of x[4]=5.000000  y[4]=161.000000

 The value of y=7.011806*x^1.966121
-----------------------------------------------
 OUTPUT

 The value of n = 5
 The value of x[0]=1.000000  y[0]=0.500000
 The value of x[1]=2.000000  y[1]=2.000000
 The value of x[2]=3.000000  y[2]=4.500000
 The value of x[3]=4.000000  y[3]=8.000000
 The value of x[4]=5.000000  y[4]=12.500000

 The value of y=0.500000*x^2.000000
-----------------------------------------------
```

```
              /* Fit a parabola of the form y=a+bx+cx^2 */

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

void main()
{
    int i,n;
     float x[50],y[50],a=1.0,b=1.0,c=1.0,sx=0.0,sx3=0.0,sx2=0.0,sx4=0.0,
       sy=0.0,sxy=0.0,sx2y=0.0;

    FILE *fp;
    fp=fopen("para.o","a");
    clrscr();

    fprintf(fp,"\n OUTPUT");
    printf("\n\n Enter the value of n: ");
    scanf("%d",&n);
    fprintf(fp,"\n\n The value of n = %d",n);

    for(i=0;i<n;i++)
    {
    printf("\n Enter the value of x and y: ");
    scanf("%f%f",&x[i],&y[i]);
    fprintf(fp,"\n The value of x[%d]=%f \t y[%d]=%f",i,x[i],i,y[i]);
    }

    for(i=0;i<n;i++)
    {
    sx+=x[i];
    sx2+=x[i]*x[i];
    sx3+=x[i]*x[i]*x[i];
    sx4+=x[i]*x[i]*x[i]*x[i];
    sy+=y[i];
    sxy+=x[i]*y[i];
    sx2y+=x[i]*x[i]*y[i];
    }

    for(i=0;i<=500;i++)
    {
    c=(sy-(a*sx2)-(b*sx))/n;
    a=(sx2y-(b*sx3)-(c*sx2))/sx4;
    b=(sxy-(a*sx3)-(c*sx))/sx2;
    }

    printf("\n\n The value of y=%f*x^2+%f*x+%f",a,b,c);
    fprintf(fp,"\n\n The value of y=%f*x^2+%f*x+%f",a,b,c);

    fprintf(fp,"\n-------------------------------------------------");
    getch();
}
```

```
      /* Output for fitting a parabola of the form y=a+bx+cx^2 */

 OUTPUT

 The value of n = 3
 The value of x[0]=0.000000  y[0]=1.000000
 The value of x[1]=1.000000  y[1]=6.000000
 The value of x[2]=2.000000  y[2]=17.000000

 The value of y=3.000004*x^2+1.999993*x+1.000001
----------------------------------------------------

 OUTPUT

 The value of n = 5
 The value of x[0]=0.000000  y[0]=2.400000
 The value of x[1]=1.000000  y[1]=3.200000
 The value of x[2]=2.000000  y[2]=3.700000
 The value of x[3]=3.000000  y[3]=5.100000
 The value of x[4]=4.000000  y[4]=7.800000

 The value of y=0.335714*x^2+-0.072857*x+2.571429
----------------------------------------------------

 OUTPUT

 The value of n = 4
 The value of x[0]=1.000000  y[0]=52.000000
 The value of x[1]=2.000000  y[1]=58.000000
 The value of x[2]=3.000000  y[2]=65.000000
 The value of x[3]=4.000000  y[3]=70.000000

 The value of y=-0.202519*x^2+7.109380*x+44.997055
----------------------------------------------------
```

```
               /* Newton’s forward interpolation method */

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

void main()
{
    int i,j,m,n;
    float u,x[50],y[50][50],X,Y,au[50];

    FILE *fp;
    fp=fopen("forwd.o","a");
    clrscr();

    fprintf(fp,"\n OUTPUT");
    printf("\n\n Enter the value of n: ");
    scanf("%d",&n);
    fprintf(fp,"\n\n The value of n = %d",n);
    printf("\n\n Enter the interpolation point X: ");
    scanf("%f",&X);
    fprintf(fp,"\n\n The value of interpolation point X = %f",X);

    for(i=0;i<=n;i++)
    {
    printf("\n\n Enter the %d set of x & y values: ",i);
    scanf("%f%f",&x[i],&y[0][i]);
    fprintf(fp,"\n The %d set of x and y values: %f \t %f",i,x[i],y[0][i]);
    }

    u=(X-x[0])/(x[1]-x[0]);
    printf("\n u=%f",u);
     fprintf(fp,"\n u=%f",u);
    Y=y[0][0];
    au[0]=1;
    m=n-1;

    for(i=1;i<=n;i++)
    {
    au[i]=(au[i-1]*(u-(i-1)))/i;
    for(j=0;j<=m;j++)
    {
    y[i][j]=y[i-1][j+1]-y[i-1][j];
    }
    Y+=au[i]*y[i][0];
    m=m-1;
    }

    printf("\n\n The value of y=%f",Y);
    fprintf(fp,"\n\n The value of y=%ff",Y);

    fprintf(fp,"\n--------------------------------------------------");
    getch();
}
```

```
         /* Output for Newton’s forward interpolation method */

 OUTPUT

 The value of n = 6

 The value of interpolation point X = 0.200000
 The 0 set of x and y values: 0.000000     176.000000
 The 1 set of x and y values: 1.000000     185.000000
 The 2 set of x and y values: 2.000000     194.000000
 The 3 set of x and y values: 3.000000     203.000000
 The 4 set of x and y values: 4.000000     212.000000
 The 5 set of x and y values: 5.000000     220.000000
 The 6 set of x and y values: 6.000000     229.000000
 u=0.200000

 The value of y=177.672318
----------------------------------------------------

 OUTPUT

 The value of n = 4

 The value of interpolation point X = 9.000000
 The 0 set of x and y values: 8.000000     1000.000000
 The 1 set of x and y values: 10.000000    1900.000000
 The 2 set of x and y values: 12.000000    3250.000000
 The 3 set of x and y values: 14.000000    5400.000000
 The 4 set of x and y values: 16.000000    8950.000000
 u=0.500000

 The value of y=1405.859375
----------------------------------------------------

 OUTPUT

 The value of n = 3

 The value of interpolation point X = 3.000000
 The 0 set of x and y values: 2.000000     94.800003
 The 1 set of x and y values: 5.000000     87.400002
 The 2 set of x and y values: 8.000000     81.300003
 The 3 set of x and y values: 11.000000    75.099998
 u=0.333333

 The value of y=92.102470
----------------------------------------------------
```

```
              /* Newton’s backward interpolation method */

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

void main()
{
    int i,j,m,n;
    float u,x[50],y[50][50],X,Y,au[50];

    FILE *fp;
    fp=fopen("back.o","a");
    clrscr();

    fprintf(fp,"\n OUTPUT");
    printf("\n\n Enter the value of n: ");
    scanf("%d",&n);
    fprintf(fp,"\n\n The value of n = %d",n);
    printf("\n\n Enter the interpolation point X: ");
    scanf("%f",&X);
    fprintf(fp,"\n\n The value of interpolation point X = %f",X);

    for(i=0;i<=n;i++)
    {
    printf("\n\n Enter the %d set of x & y values: ",i);
    scanf("%f%f",&x[i],&y[0][i]);
    fprintf(fp,"\n The %d set of x and y values: %f \t %f",i,x[i],y[0][i]);
    }

    u=(X-x[n])/(x[1]-x[0]);
    printf("\n u=%f",u);
     fprintf(fp,"\n u=%f",u);
    Y=y[0][n];
    au[0]=1;
    m=n-1;

    for(i=1;i<=n;i++)
    {
    au[i]=(au[i-1]*(u+(i-1)))/i;
    for(j=0;j<=m;j++)
    {
    y[i][j]=y[i-1][j+1]-y[i-1][j];
    }
    Y+=au[i]*y[i][m];
    m=m-1;
    }

    printf("\n\n The value of y=%f",Y);
    fprintf(fp,"\n\n The value of y=%ff",Y);

    fprintf(fp,"\n---------------------------------------------------");
    getch();
}
```

```
        /* Output for Newton’s backward interpolation method */

 OUTPUT

 The value of n = 4

 The value of interpolation point X = 275.000000
 The 0 set of x and y values: 100.000000   958.000000
 The 1 set of x and y values: 150.000000   917.000000
 The 2 set of x and y values: 200.000000   865.000000
 The 3 set of x and y values: 250.000000   799.000000
 The 4 set of x and y values: 300.000000   712.000000
 u=-0.500000

 The value of y=758.718750
-----------------------------------------------------
 OUTPUT

 The value of n = 4

 The value of interpolation point X = 15.000000
 The 0 set of x and y values: 8.000000     1000.000000
 The 1 set of x and y values: 10.000000    1900.000000
 The 2 set of x and y values: 12.000000    3250.000000
 The 3 set of x and y values: 14.000000    5400.000000
 The 4 set of x and y values: 16.000000    8950.000000
 u=-0.500000

 The value of y=6952.734375
-----------------------------------------------------
 OUTPUT

 The value of n = 3

 The value of interpolation point X = 9.000000
 The 0 set of x and y values: 2.000000     94.800003
 The 1 set of x and y values: 5.000000     87.400002
 The 2 set of x and y values: 8.000000     81.300003
 The 3 set of x and y values: 11.000000    75.099998
 u=-0.666667

 The value of y=79.313583
-----------------------------------------------------
```

```c
                  /* Lagrange’s Interpolation Method */

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

void main()
{
    int i,j,n;
    float x[50],y[50],X,Y=0.0,NR,DR,prod=1.0;

    FILE *fp;
    fp=fopen("lagr.o","a");
    clrscr();

    fprintf(fp,"\n OUTPUT");
    printf("\n\n Enter the number of intervals n: ");
    scanf("%d",&n);
    fprintf(fp,"\n\n The value of n = %d",n);
    printf("\n\n Enter the interpolation point X: ");
    scanf("%f",&X);
    fprintf(fp,"\n\n The value of interpolation point X = %f",X);

    for(i=0;i<=n;i++)
    {
    printf("\n\n Enter the %d set of x & y values: ",i);
    scanf("%f%f",&x[i],&y[i]);
    fprintf(fp,"\n The %d set of x and y values: %f \t %f",i,x[i],y[i]);
    }

    for(i=0;i<=n;i++)
    {
    prod=1.0;
    for(j=0;j<=n;j++)
    {
    if(j!=i)
    {
    NR=X-x[j];
    DR=x[i]-x[j];
    prod*=(NR/DR);
    }
    }
    Y+=prod*y[i];
    }

    printf("\n\n The value of y=%f",Y);
    fprintf(fp,"\n\n The value of y=%ff",Y);

    fprintf(fp,"\n--------------------------------------------------");
    fclose(fp);
    getch();
}
```

```
            /* Output for Lagrange’s Interpolation Method */

 OUTPUT

 The value of n = 3

 The value of interpolation point X = 8.000000
 The 0 set of x and y values: 2.000000     4.000000
 The 1 set of x and y values: 3.000000     6.000000
 The 2 set of x and y values: 12.000000    24.000000
 The 3 set of x and y values: 41.000000    82.000000

 The value of y=16.000000
--------------------------------------------------------------
 OUTPUT

 The value of n = 3

 The value of interpolation point X = 6.000000
 The 0 set of x and y values: 3.000000 168.000000
 The 1 set of x and y values: 7.000000     120.000000
 The 2 set of x and y values: 9.000000 72.000000
 The 3 set of x and y values: 10.000000    63.000000

 The value of y=147.000000
--------------------------------------------------------------
 OUTPUT

 The value of n = 3

 The value of interpolation point X = 301.000000
 The 0 set of x and y values: 300.000000   2.477100
 The 1 set of x and y values: 304.000000   2.482900
 The 2 set of x and y values: 305.000000   2.484300
 The 3 set of x and y values: 307.000000   2.487100

 The value of y=2.478597
--------------------------------------------------------------
```