TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

Lab Sheet

PURWANCHAL CAMPUS

DHARAN-8

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Date: 2077/11/03

<u>Submitted to:</u>

Department of
Electronics & Computer
Engineering

Checked by: ……………………….

Title:

Bisection Method

Program:

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

int main()
{
   int n=0;
   float x,y;
   float lr,ur,cr,precission;
   precission=0.001;
   lr=3;
   ur=10;
   //y=(pow(x,3)-(4*x)-9);

   //printf("%f",y);

   while(1){

      cr=(ur+lr)/2;
      x=cr;
      y=(pow(x,2)-(4*x)-5);

      printf("\nIteration: %d, \nCurrent root %f",n,cr);

      if(y<precission&&y>-precission){
         printf("\n\nRoot is x = %f",cr);
         printf("\n\n\tF(%f) = %f\n",cr,y);
         break;
      }
      if(y>0){
         ur=cr;
      }
      if(y<0){
         lr=cr;
      }

      n++;

   }

   return 0;
}
```

Output:

```
"E:\B.E\4th sem\NM\Pratice\bisection method\bisection method\bin\Debug\bisection method.exe"

Iteration: 0,
Current root 6.500000
Iteration: 1,
Current root 4.750000
Iteration: 2,
Current root 5.625000
Iteration: 3,
Current root 5.187500
Iteration: 4,
Current root 4.968750
Iteration: 5,
Current root 5.078125
Iteration: 6,
Current root 5.023438
Iteration: 7,
Current root 4.996094
Iteration: 8,
Current root 5.009766
Iteration: 9,
Current root 5.002930
Iteration: 10,
Current root 4.999512
Iteration: 11,
Current root 5.001221
Iteration: 12,
Current root 5.000366
Iteration: 13,
Current root 4.999939

Root is x = 4.999939

        F(4.999939) = -0.000366

Process returned 0 (0x0)   execution time : 0.013 s
Press any key to continue.
```

Title:

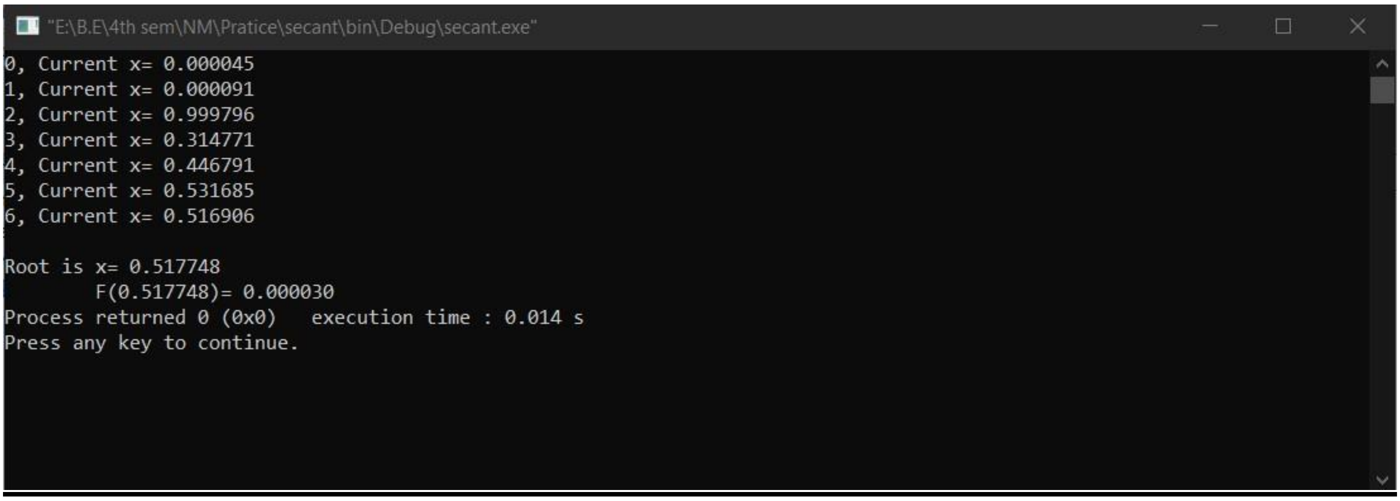
Secant Method

Program:

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#define F(x) (cos(x)-(x*exp(x)))

int main()
{
  float xnm1=0,xn=10,xnp1,precission=0.0001;
  int n=0;

  while(1){

    xnp1=(xn-(((xn-xnm1)/(F(xn)-F(xnm1)))*F(xn)));
```

```
 if(F(xnp1)<=precission&&F(xnp1)>=(-precission)){
        printf("\nRoot is x= %f",xnp1);
        printf("\n\tF(%f)= %f",xnp1,F(xnp1));
        break;
    }

    printf("%d, Current x= %f\n",n++,xnp1);
    xnm1=xn;
    xn=xnp1;

  }
  return 0;
}
```

Output:



"E:\B.E\4th sem\NM\Pratice\secant\bin\Debug\secant.exe"

```
0, Current x= 0.000045
1, Current x= 0.000091
2, Current x= 0.999796
3, Current x= 0.314771
4, Current x= 0.446791
5, Current x= 0.531685
6, Current x= 0.516906

Root is x= 0.517748
        F(0.517748)= 0.000030
Process returned 0 (0x0)   execution time : 0.014 s
Press any key to continue.
```

Title:

Newton Raphson Method

Program:

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#define F(x) ((3*x)-cos(x)-1)

float FirstDerivative(float);

int main()
{
  float x=100,precission=0.0001;
  int n=0;
```

```
    while(1){

        printf("%d, Current x= %f\n",n++,x);

        x=(x-(F(x)/FirstDerivative(x)));

        if(F(x)<=precission&&F(x)>=(-precission)){
            printf("\nRoot is x= %f",x);
            printf("\n\tF(%f) = %f",x,F(x));
            break;
        }
    }
    return 0;
}


float FirstDerivative(float x)
{
    float derv_precision=0.0001;
    float y;
    float x1=x-derv_precision;
    float x2=x+derv_precision;
    y=((F(x2)-F(x1))/(x2-x1));
    return y;
}
```

Output:

"E:\B.E\4th sem\NM\Pratice\newton rapson\bin\Debug\newton rapson.exe"

```
0, Current x= 100.000000
1, Current x= -15.981727
2, Current x= -1.352407
3, Current x= 1.255119
4, Current x= 0.633906
5, Current x= 0.607183

Root is x= 0.607102
        F(0.607102) = -0.000000
Process returned 0 (0x0)   execution time : 0.009 s
Press any key to continue.
```

Title:

Guss Elimination Method

Program:

```
#include<stdio.h>
#define row 4
#define col 5

void display(float A[row][col]){
    int i,j;
    for(i=0;i<row;i++){
        for(j=0;j<col;j++){
            printf("%0.2f\t",A[i][j]);
        }
        printf("\n");
    }
}
int main()
{
    int i,j,k,n=0,l,f=0;
    float A[row][col]={
        {10,-7,3,5,6},
        {-6,8,-1,-4,5},
        {3,1,4,11,2},
        {5,-9,-2,4,7}
    };
    /*float A[row][col]={
        {1,4,-1,-5},
        {1,1,-6,-12},
        {3,-1,-1,4},
    };*/
    float temp,Factor,Sum,X[row];
    printf("Original Equations:\n\n");
    display(A);
    printf("\n\n");
    for(k=0;k<row;k++){
        for(f=(k+1);f<row;f++){
            //printf("\n(%f/%f)\n",A[f][k],A[k][k]);
            Factor=(A[f][k]/A[k][k]);
            for(i=k;i<col;i++){
                temp=(A[f][i]-(A[k][i]*Factor));
                A[f][i]=temp;
            }
            //printf("\n");
            //printf("\n%f\n",A[k][k]);
        }
    }
    printf("Equations after elimination:\n\n");
    display(A);
    printf("\n");
    X[row-1]=A[row-1][col-1]/A[row-1][col-2];
    //printf("T %f",X[row-1]);
```

```
    for(i=(row-2);i>=0;i--){
        Sum=0;
        for(j=(col-2);j>=(i+1);j--){
            //printf("X%f\t",X[i+1]);
            //printf("y%f\t%f",X[j],A[i][j]);
            Sum=Sum+(A[i][j]*X[j]);
        }
        //printf("ksd\n");
        X[i]=(A[i][col-1]-Sum)/A[i][i];
        //printf("l%f",Sum);
        //printf("\n");
    }
    printf("\nSolution is:\n\n");
    for(i=0;i<row;i++){
        printf("%0.2f\t",X[i]);
    }
    printf("\n");
    return(0);
}
```

Output:

```
"E:\B.E\4th sem\NM\Pratice\gauss elimination\bin\Debug\gauss elimination.exe"
Original Equations:

10.00   -7.00   3.00    5.00    6.00
-6.00   8.00    -1.00   -4.00   5.00
3.00    1.00    4.00    11.00   2.00
5.00    -9.00   -2.00   4.00    7.00


Equations after elimination:

10.00   -7.00   3.00    5.00    6.00
0.00    3.80    0.80    -1.00   8.60
-0.00   -0.00   2.45    10.32   -6.82
0.00    -0.00   -0.00   9.92    9.92


Solution is:

5.00    4.00    -7.00   1.00

Process returned 0 (0x0)   execution time : 0.013 s
Press any key to continue.
```

Title:

Guss Jordan Method

Program:

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

```
#define row 4
#define col 5

void display(float A[row][col]){
    int i,j;
    for(i=0;i<row;i++){
        for(j=0;j<col;j++){
            printf("%0.2f\t",A[i][j]);
        }
        printf("\n");
    }
}
int main()
{
    int i,j,k,n=0,l,f=0;
    float A[row][col]={
        {10,-7,3,5,6},
        {-6,8,-1,-4,5},
        {3,1,4,11,2},
        {5,-9,-2,4,7}
    };
    /*float A[row][col]={
        {1,4,-1,-5},
        {1,1,-6,-12},
        {3,-1,-1,4},
    };*/
    float temp,Factor,Sum,X[row];
    printf("Original Equations:\n\n");
    display(A);
    printf("\n\n");
    for(k=0;k<row;k++){
        for(f=(k+1);f<row;f++){
            //printf("\n(%f/%f)\n",A[f][k],A[k][k]);
            Factor=(A[f][k]/A[k][k]);
            for(i=k;i<col;i++){
                temp=(A[f][i]-(A[k][i]*Factor));
                A[f][i]=temp;
            }
            //printf("\n");
            //printf("\n%f\n",A[k][k]);
        }
    }
    printf("Equations after elimination:\n\n");
    display(A);
    printf("\n");

    for(k=(row-2);k>=0;k--){
        for(f=(k);f>=0;f--){
```

```
            //printf("%f\t",A[k][f]);
            //printf("(%f/%f)\t",A[f][k+1],A[k+1][k+1]);
            Factor=(A[f][k+1]/A[k+1][k+1]);
            for(i=f;i<col;i++){
               //printf("%f\t",A[f][i]);
               //printf("xx%f\t",A[k+1][i]);
               temp=(A[f][i]-(A[k+1][i]*Factor));
               A[f][i]=temp;
            }
            //printf("\n");
         }
      }

      printf("Equations after elimination:\n\n");
      display(A);
      printf("\n");
      printf("\nSolution is:\n\n");
      for(i=0;i<row;i++){
         printf("%0.2f\t",(A[i][col-1]/A[i][i]));
      }
      printf("\n");
      return(0);
   }
```

Output:

```
"E:\B.E\4th sem\NM\Pratice\gauss jordan\bin\Debug\gauss jordan.exe"
Original Equations:

10.00   -7.00   3.00    5.00    6.00
-6.00   8.00    -1.00   -4.00   5.00
3.00    1.00    4.00    11.00   2.00
5.00    -9.00   -2.00   4.00    7.00


Equations after elimination:

10.00   -7.00   3.00    5.00    6.00
0.00    3.80    0.80    -1.00   8.60
-0.00   -0.00   2.45    10.32   -6.82
0.00    -0.00   -0.00   9.92    9.92

Equations after elimination:

10.00   -0.00   -0.00   -0.00   50.00
0.00    3.80    -0.00   -0.00   15.20
-0.00   -0.00   2.45    0.00    -17.13
0.00    -0.00   -0.00   9.92    9.92


Solution is:

5.00    4.00    -7.00   1.00

Process returned 0 (0x0)   execution time : 0.015 s
Press any key to continue.
```

Title:

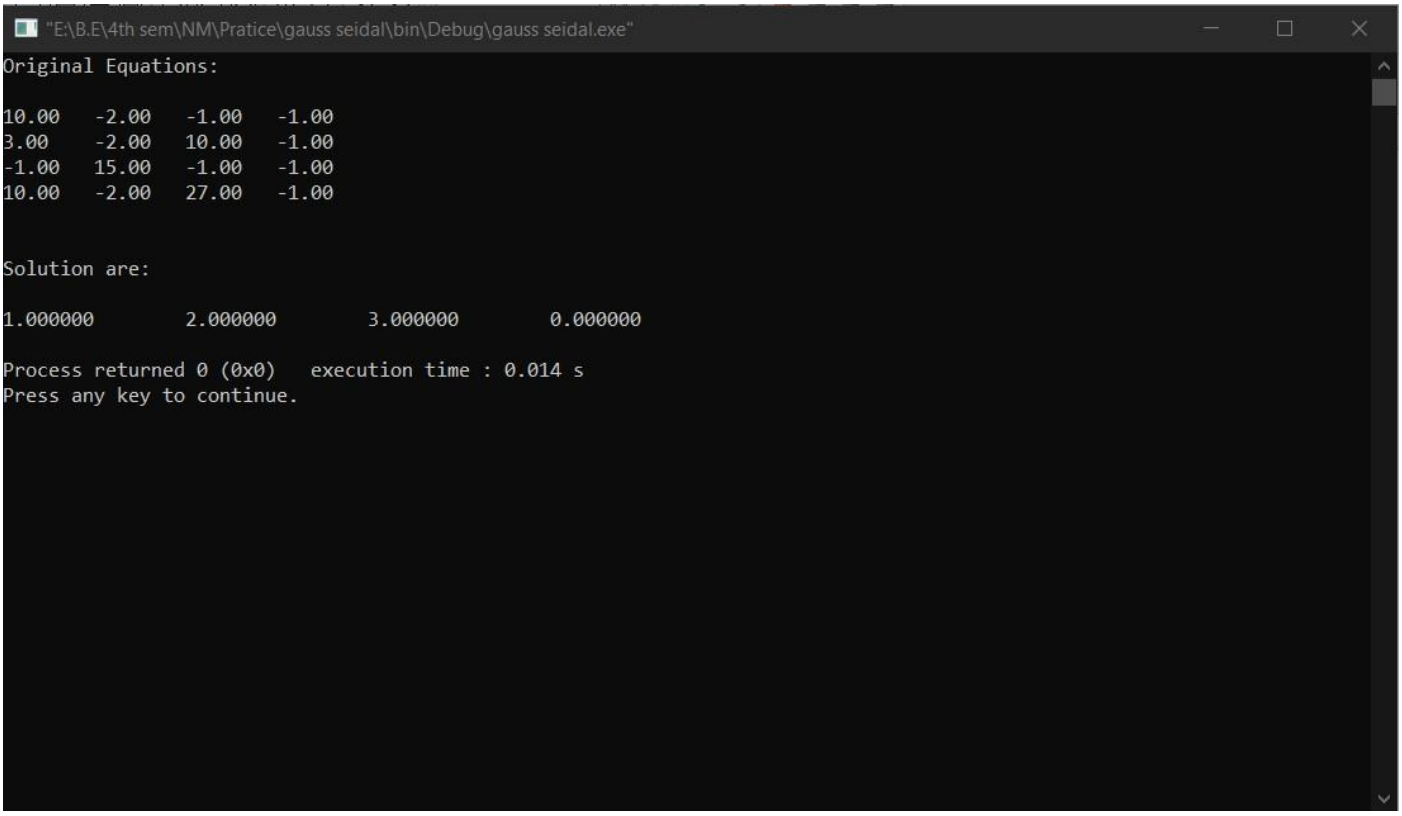
Guss Sidel Method

Program:

```
#include<stdio.h>
#define row 4
#define col 5

void display(float A[row][row]){
   int i,j;
   for(i=0;i<row;i++){
      for(j=0;j<row;j++){
         printf("%0.2f\t",A[i][j]);
      }
      printf("\n");
   }
}



int main()
{
   int i,j,k,n=0,l,f=0;
   /*float A[row][col]={
      {20,1,-2,17},
      {3,20,-1,-18},
      {2,-3,20,25}
   };*/
   float A[row][col]={
      {10,-2,-1,-1,3},
      {-2,10,-1,-1,15},
      {-1,-1,10,-2,27},
      {-1,-1,-2,10,-9}
   };
   float temp,Factor,Sum,InitialGuess[row]={0,0,0};
   printf("Original Equations:\n\n");
   display(A);
   printf("\n\n");

   for(n=0;n<10;n++){        //precision
      for(i=0;i<row;i++){
         Sum=A[i][col-1];
         //printf("X%0.2f\n",Sum);
         for(j=0;j<(row);j++){
            if(i!=j){
               Sum=(Sum-(InitialGuess[j]*A[i][j]));
            }
```

```
            }
            InitialGuess[i]=(Sum/A[i][i]);
            //printf("X%0.2f",A[i][i]);
          }
        }
        printf("Solution are:\n\n");
        for(i=0;i<row;i++){
          printf("%f\t",InitialGuess[i]);
        }
        printf("\n");

        return(0);
    }
```

Output:



```
"E:\B.E\4th sem\NM\Pratice\gauss seidal\bin\Debug\gauss seidal.exe"
Original Equations:

10.00   -2.00   -1.00   -1.00
3.00    -2.00   10.00   -1.00
-1.00   15.00   -1.00   -1.00
10.00   -2.00   27.00   -1.00


Solution are:

1.000000        2.000000        3.000000        0.000000

Process returned 0 (0x0)   execution time : 0.014 s
Press any key to continue.
```

Title:

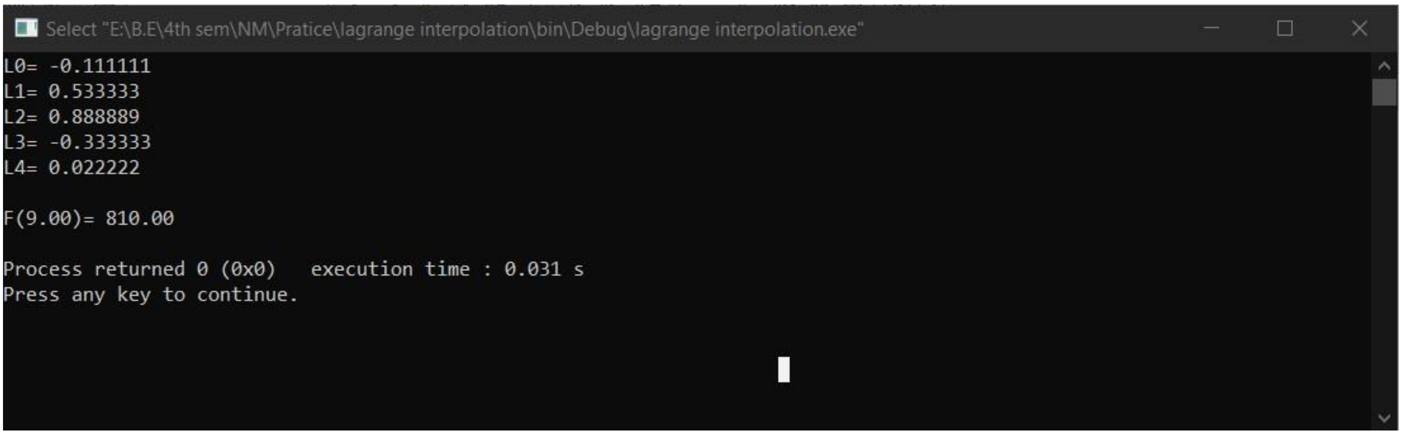
Lagrange Interpolation

Program:

```
#include <stdio.h>
#include <stdlib.h>
#define Size 5

int main()
```

```
{
   float X[Size]={5,7,11,13,17};
   float Y[Size]={150,392,1452,2366,5202};
   /*float X[Size]={1,3,4,6,7};
   float Y[Size]={1,53,127,531,687};*/
   int i,j;
   float x=9,Sum=1,Px=0,numtr,dnumtr;

   for(i=0;i<Size;i++){
      //printf("%f\t",Y[i]);
      numtr=1;
      dnumtr=1;
      for(j=0;j<Size;j++){
         if(i!=j){
            numtr=numtr*(x-X[j]);
            dnumtr=dnumtr*(X[i]-X[j]);
            //printf("Xj= %f\t",X[j]);
         }

      }
      //printf("\n");
      Sum=numtr/dnumtr;
      Px=Px+(Y[i]*Sum);
      printf("L%d= %f\n",i,Sum);
      Sum=1;
   }

   printf("\nF(%0.2f)= %0.2f\n",x,Px);
   return 0;
}
```

Output:



Title:

Newton Divided Difference Interpolation

Program:

```
#include <stdio.h>
#include <stdlib.h>
#define Size 5
/*
float X[Size]={5,7,11,13,17};
float Y[Size]={150,392,1452,2366,5202};
*/
/*float X[Size]={-4,-1,0,2,5};
float Y[Size]={1245,33,5,9,1335};*/
float X[Size]={1,3,4,6,7};
float Y[Size]={1,53,127,531,687};

float table[Size][Size];

void DividedDifference(int n){
   float diff;
   int i,j;
   if(n==0){
      for(i=0;i<(Size-(n+1));i++){
         diff=((Y[i+1]-Y[i])/(X[i+1]-X[i]));
         table[i][n]=diff;
      }
   }
   else{
      for(i=0;i<(Size-(n+1));i++){
         //printf("T= %f\n",table[n-1][i]);
         diff=((table[i+1][n-1]-table[i][n-1])/(X[i+n+1]-X[i]));
         table[i][n]=diff;
      }
   }



}

int main()
{
   int i,j;
   float x=5.5,Sum=1,Px=0,numtr,dnumtr;
   for(i=0;i<(Size-1);i++){
      DividedDifference(i);
   }
   printf("\n  Divided Difference table is:\n\n");
```

```
    for(i=0;i<(Size-1);i++){
       for(j=0;j<(Size-(i+1));j++){
          printf("  %7.2f\t",table[i][j]);
       }
       printf("\n");
    }
    printf("\n");
    Px=Y[0];
    //printf("%f",Px);
    for(i=0;i<(Size-1);i++){
       for(j=0;j<(i+1);j++){
          Sum=Sum*(x-X[j]);
          //printf("l%f\t",X[j]);
       }
       //printf("%f",table[0][i]*Sum);
       //printf("\n");
       Px=Px+(Sum*table[0][i]);
       Sum=1;
    }

    printf("\n  F(%0.2f)= %0.2f\n",x,Px);
    return 0;
}
```

Output:

```
"E:\B.E\4th sem\NM\Pratice\newton divided difference\bin\Debug\newton divided difference.exe"

 Divided Difference table is:

   26.00          16.00           5.33          -3.31
   74.00          42.67         -14.50
  202.00         -15.33
  156.00


 F(5.50)= 415.89

Process returned 0 (0x0)   execution time : 0.012 s
Press any key to continue.
```

Title:

Newton Forward Interpolation

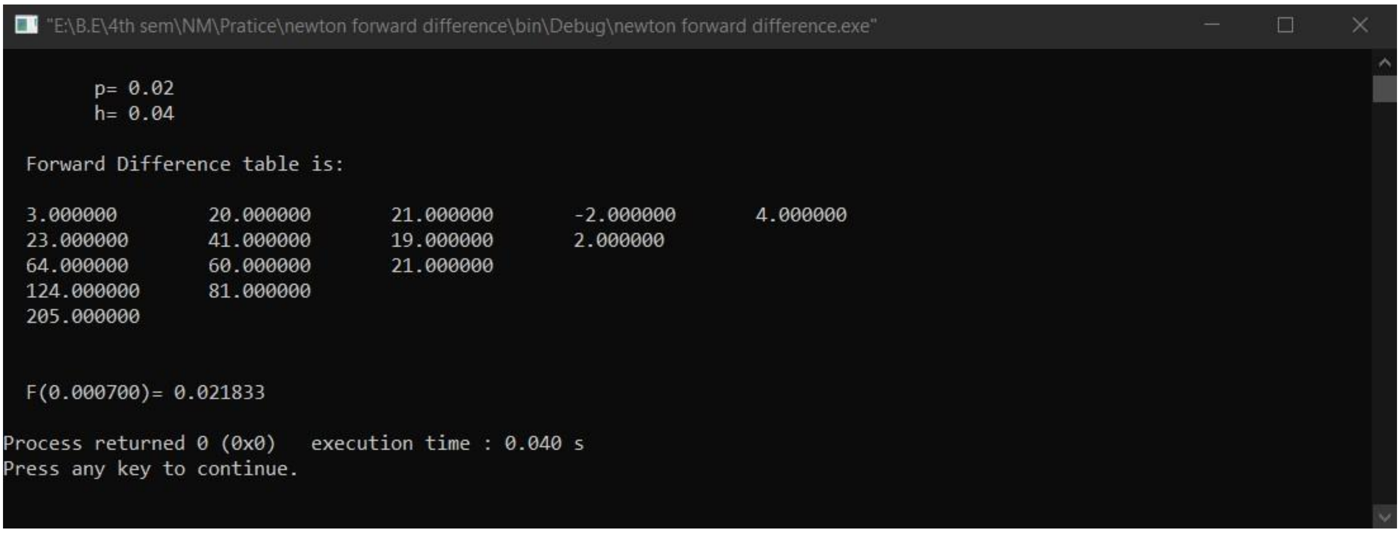
Program:

```
#include <stdio.h>
#include <stdlib.h>
#define Size 6
```

```
/*
float X[Size]={5,7,11,13,17};
float Y[Size]={150,392,1452,2366,5202};
*/
/*float X[Size]={-4,-1,0,2,5};
float Y[Size]={1245,33,5,9,1335};*/
/*float X[Size]={0,0.001,0.002,0.003,0.004,0.005};
float Y[Size]={1.121,1.123,1.1255,1.127,1.128,1.1285};*/

/*float X[Size]={0,0.2,0.4,0.6,0.8,1.0};
float Y[Size]={1,0.808,0.664,0.616,0.712,1};*/
float X[Size]={0,0.04,0.08,0.12,0.16,0.20};
float Y[Size]={0,3,26,90,214,419};



float table[Size][Size];

float Factroial(int num){
   int i;
   float fact=1;
   for(i=1;i<=num;i++){
     fact=fact*i;
   }
  return fact;
}

void DividedDifference(int n){
   float diff;
   int i,j;
   if(n==0){
       for(i=0;i<(Size-(n+1));i++){
           diff=(Y[i+1]-Y[i]);
           table[i][n]=diff;
       }
   }
   else{
       for(i=0;i<(Size-(n+1));i++){
           //printf("T= %f\n",table[n-1][i]);
           diff=(table[i+1][n-1]-table[i][n-1]);
           table[i][n]=diff;
       }
   }



}
```

```
int main()
{
   int i,j;
   float x=0.00070,Sum=1,Px=0,h,u;
   for(i=0;i<(Size-1);i++){
      DividedDifference(i);
   }
   h=X[1]-X[0];
   u=((x-X[0])/h);
   printf("\n\tp= %0.2f\n\th= %0.2f\n",u,h);
   printf("\n  Forward Difference table is:\n\n");
   for(i=0;i<(Size-1);i++){
      for(j=0;j<(Size-(i+1));j++){
         printf("  %8f\t",table[i][j]);
      }
      printf("\n");
   }
   printf("\n");

   Px=Y[0];
   //printf("l%f",Px);
   for(i=0;i<(Size-1);i++){
      for(j=0;j<(i+1);j++){
         Sum=Sum*(u-j);
      }
      Px=Px+((Sum*table[0][i])/Factroial(i+1));
      Sum=1;
   }

   printf("\n  F(%f)= %f\n",x,Px);
   return 0;
}
```

Output:



```
"E:\B.E\4th sem\NM\Pratice\newton forward difference\bin\Debug\newton forward difference.exe"

        p= 0.02
        h= 0.04

  Forward Difference table is:

  3.000000        20.000000       21.000000       -2.000000       4.000000
  23.000000       41.000000       19.000000       2.000000
  64.000000       60.000000       21.000000
  124.000000      81.000000
  205.000000


  F(0.000700)= 0.021833

Process returned 0 (0x0)   execution time : 0.040 s
Press any key to continue.
```

Title:

Numerical differentiation (central formulafor f’(x)and f’’(x))

Program:

```
#include <stdio.h>
#include <stdlib.h>
#include<math.h>
#define Size 7

float X[Size]={0,0.1,0.2,0.3,0.4,0.5,0.6};   //central
float Y[Size]={30.13,31.62,32.87,33.64,33.95,33.81,33.24};

/*float X[Size]={1,1.05,1.10,1.15,1.20,1.25,1.30};   //central
float Y[Size]={1,1.0247,1.0488,1.0723,1.0954,1.1180,1.1401};*/


float table[Size][Size]={0}; //initilize array with 0

float Factroial(int num){
   int i;
   float fact=1;
   for(i=1;i<=num;i++){
     fact=fact*i;
   }
  return fact;
}


void CentralDifference(){
   float diff;
   int i,j;
   for(int n=0;n<(Size-1);n++){
      if(n==0){
         for(i=0;i<(Size-(n+1));i++){
            diff=(Y[i+1]-Y[i]);
            table[i][n]=diff;
         }
      }
      else{
         for(i=0;i<(Size-(n+1));i++){
            //printf("T= %f\n",table[n-1][i]);
            diff=(table[i+1][n-1]-table[i][n-1]);
            table[i][n]=diff;
         }
      }
   }
```

```
}


float FirstDiff(float h, int X0){
   float sum=0;
   int cur_indx=X0,term_count=0;
   for(int i=0;i<Size;i+=2){
      if(i%2==0){

sum=sum+((pow(Factroial(term_count),2)/Factroial(i+1))*((table[cur_indx][i]+table[cur_indx-
1][i])/2));
      }
      else{
         sum=sum-
(((pow(Factroial(term_count),2)/Factroial(i+1)))*((table[cur_indx][i]+table[cur_indx-1][i])/2));
      }
      //printf("%d  %f ",i,(pow(Factroial(term_count),2)/Factroial(i+1)));
      cur_indx--;
      term_count++;
   }

   sum=sum/h;
   //printf("\n%d",X0);
   return sum;


}

float SecondDiff(float h, int X0){
   float sum=0;
   int cur_indx=X0,term_count=0;
   for(int i=0;i<Size;i++){
      if(i%2!=0){
         cur_indx--;
         if(term_count%2==0){

sum=sum+((pow(Factroial(term_count),2)/(Factroial(i)*(term_count+1)))*(table[cur_indx][i]));
         }
         else{
            sum=sum-
((pow(Factroial(term_count),2)/(Factroial(i)*(term_count+1)))*(table[cur_indx][i]));
         }
         //printf("%d \n",i+1);
         //printf(" %f ",(pow(Factroial(term_count),2)/(Factroial(i)*(term_count+1))));
         term_count++;

      }
```

```
    }

    sum=sum/pow(h,2);
    //printf("\n%d",X0);
    return sum;
}

int main()
{
    int i,j,X0;
    float x=0.3,Px=0,h,u,temp;


    //finding nearer value index
    X0=0;
    temp=X[X0];
    for(i=0;i<Size;i++){
        for(j=1;j<Size;j++){
            if(fabs(X[j]-x)<=fabs(temp-x)){
                X0=j;
                temp=X[j];
            }
        }
    }
    h=X[1]-X[0];
    u=((x-X[X0])/h);
    Px=Y[X0];
    printf("\n  X0= %f\n",X[X0]);
    printf("  h = %f\n",h);
    printf("  p = %f\n",u);

    CentralDifference();

    printf("\n  Central Difference table is:\n\n");
    for(i=0;i<(Size-1);i++){
        for(j=0;j<(Size-(i+1));j++){
            printf("  %f\t",table[i][j]);
        }
        printf("\n");
    }
    printf("\n");

    printf("\n\tF'(X) = %f\n",FirstDiff(h,X0));
     printf("\n\tF''(X) = %f\n",SecondDiff(h,X0));


    return 0;
}
```

Output:

```
"E:\B.E\4th sem\NM\Pratice\differentation\centeral difference interpolation - Copy\bin\Debug\centeral difference interpolation.exe"

 X0= 0.300000
 h = 0.100000
 p = 0.000000

 Central Difference table is:

 1.490002       -0.240004      -0.239994      0.259993       -0.269993      0.289995
 1.249998       -0.479998      0.019999       -0.010000      0.020002
 0.770000       -0.459999      0.009998       0.010002
 0.310001       -0.450001      0.020000
 -0.139999      -0.430000
 -0.570000


       F'(X) = 5.383342

       F''(X) = -45.594353

Process returned 0 (0x0)   execution time : 0.013 s
Press any key to continue.
```

Title:

Numerical Integration (trapezoidal,Simpson's 1/3 and simpson's 3/8)

Program:

```
#include <iostream>
#include<math.h>
#define Size 10
//#define F(X) (1/(1+pow(X,2))
using namespace std;

float F(float X){
   return (1/(1+pow(X,2)));
}

int ul=6,ll=0;
float interval=1;
int N=(ul-ll)/interval;     //for number of iteration

float X[Size],Y[Size];
```

```
/*float X[]={};
float Y[]={};*/

void AssignXY(){
    float tmp1;
    tmp1=ll;
    for(int i=0;i<=N;i++){
        //cout<<F(i)<<"\n";
        X[i]=i;
        Y[i]=F(tmp1);
        tmp1+=interval;
    }
}

void DisplayXY(){
    cout<<" "<<"X"<<"   "<<"Y"<<endl;
    for(int i=0;i<=N;i++){
        cout<<" "<<X[i]<<"   "<<Y[i]<<endl;
    }
}

float Trapezoidal(){
    float sum=0;
    for(int i=1;i<=(N-1);i++){
        sum=sum+Y[i];
    }
    sum=interval*(((Y[0]+Y[N])+(2*sum))/2);
    return sum;
}

float Simpson13(){
    float sum=0;
    for(int i=1;i<=(N-1);i++){
        if(i%2==0){
            sum=sum+(2*Y[i]);
        }
        else{
            sum=sum+(4*Y[i]);
        }

    }
    sum=interval*(((Y[0]+Y[N])+sum)/3);
    return sum;
}

float Simpson38(){
    float sum=0;
    for(int i=1;i<=(N-1);i++){
```

```
        if(i%3==0){
            sum=sum+(2*Y[i]);
        }
        else{
            sum=sum+(3*Y[i]);
        }
    }
    sum=3*interval*(((Y[0]+Y[N])+sum)/8);
    return sum;
}

int main()
{

    AssignXY();
    DisplayXY();
    cout<<"\nBy Trapezoidal rule,\n\t\t= "<<Trapezoidal();
    cout<<"\nBy Simpson's 1/3 rule,\n\t\t= "<<Simpson13();
    cout<<"\nBy Simpson's 3/8 rule,\n\t\t= "<<Simpson38();
    return 0;
}
```

<u>Output:</u>

```
"E:\B.E\4th sem\NM\Pratice\trapezoidal\bin\Debug\trapezoidal.exe"
 X   Y
 0   1
 1   0.5
 2   0.2
 3   0.1
 4   0.0588235
 5   0.0384615
 6   0.027027

By Trapezoidal rule,
                = 1.4108
By Simpson's 1/3 rule,
                = 1.36617
By Simpson's 3/8 rule,
                = 1.35708
Process returned 0 (0x0)   execution time : 0.016 s
Press any key to continue.
```