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//program for gauss seidel method
#include<iostream>                                //for cout & cin
#include<stdlib.h>                                //for abs()
using namespace std;
int a[3][4];
void input();
int check();
void sswap();
void fun();
int main()
{
    int x;
    input();
    sswap();
    x=check();
    if(x==0)
        goto l1;
    fun();
l1:
    return 0;
}
void input()                                     //function for input of coefficients
{
    for(int i=0;i<3;i++)
    {
        cout<<" Enter Coefficients for equation "<<i+1<<endl;
        cout<<" a"<<i+1<<"1=";
        cin>>a[i][0];
        cout<<" a"<<i+1<<"2=";
        cin>>a[i][1];
        cout<<" a"<<i+1<<"3=";
        cin>>a[i][2];
        cout<<" b"<<i+1<<"=";
        cin>>a[i][3];
    }
}

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int check() //function for checking the condition
{
    if(abs(a[0][0])>abs(a[0][1])+abs(a[0][2]) &&
        abs(a[1][1])>abs(a[1][0])+abs(a[1][2]) &&
        abs(a[2][2])>abs(a[2][0])+abs(a[2][1]))
    {
        cout<<" Condition Check: Pass!\n";
        return 1;
    }
    else
    {
        cout<<" Condition Check: Fail!\n";
        return 0;
    }
}

void sswap() //function for swapping equations
{
    int t1,t2,t3,t4;
    if(a[1][0]>a[0][0]&&a[1][0]>a[2][1])
    {
        t1=a[0][0];    t2=a[0][1];    t3=a[0][2];    t4=a[0][3];
        a[0][0]=a[1][0];    a[0][1]=a[1][1];
        a[0][2]=a[1][2];    a[0][3]=a[1][3];
        a[1][0]=t1;    a[1][1]=t2;    a[1][2]=t3;    a[1][3]=t4;
    }
    else if(a[2][0]>a[0][0]&&a[2][0]>a[1][0])
    {
        t1=a[0][0];    t2=a[0][1];    t3=a[0][2];    t4=a[0][3];
        a[0][0]=a[2][0];    a[0][1]=a[2][1];
        a[0][2]=a[2][2];    a[0][3]=a[2][3];
        a[2][0]=t1;    a[2][1]=t2;    a[2][2]=t3;    a[2][3]=t4;
    }
    if(a[2][1]>a[1][1])
    {
        t1=a[1][0];    t2=a[1][1];    t3=a[1][2];    t4=a[1][3];
        a[1][0]=a[2][0];    a[1][1]=a[2][1];
        a[1][2]=a[2][2];    a[1][3]=a[2][3];
        a[2][0]=t1;    a[2][1]=t2;    a[2][2]=t3;    a[2][3]=t4;
    }
}

void fun() //function for finding solution

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{   float x=0,y=0,z=0,x0=0,y0=0,z0=0;
    for(int i=0;i<10;i++)
    {   x0=x;   y0=y;   z0=z;
        x=(a[0][3]-a[0][1]*y-a[0][2]*z)/a[0][0];
        y=(a[1][3]-a[1][0]*x-a[1][2]*z)/a[1][1];
        z=(a[2][3]-a[2][0]*x-a[2][1]*y)/a[2][2];
        if(x==x0&&y==y0&&z==z0)
            break;
        cout<<" X="<<x<<"\tY="<<y<<"\tZ="<<z<<endl;
    }
}

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"C:\Users\User\Desktop\IT Study Material\SY 1 4S\NSM\Practicals\NSM07.exe"
Enter Coefficients for equation 1
a11=27
a12=6
a13=-1
b1=85
Enter Coefficients for equation 2
a21=1
a22=1
a23=54
b2=110
Enter Coefficients for equation 3
a31=6
a32=15
a33=2
b3=72
Condition Check: Pass!
X=3.14815      Y=3.54074      Z=1.91317
X=2.43217      Y=3.57204      Z=1.92585
X=2.42569      Y=3.57294      Z=1.92595
X=2.42549      Y=3.57301      Z=1.92595
X=2.42548      Y=3.57302      Z=1.92595
X=2.42548      Y=3.57302      Z=1.92595
Process returned 0 (0x0)   execution time : 17.578 s
Press any key to continue.

```