**PROGRAM TO IMPLEMENT POINT, IMPLEMENT LINE SEGMENT AND TEST 5-DIMENSION OF POINT LINE CLASSIFICATION**

#include <iostream>

using namespace std;

class Point {

public: int x\_cor,y\_cor;

void enterPointCoordinate(){

cout<<"Enter the X-coordinate: ";

cin>>x\_cor;

cout<<"Enter the Y-coordinate: ";

cin>>y\_cor;

}

void displayPoint(){

cout<<"("<<x\_cor<<" ,"<<y\_cor<<")";

}

};

class Line{

public: template <class A, class B>

void line(A& a, B& b){

cout<<"For Starting Point: "<<endl;

a.enterPointCoordinate();

cout<<"For End Point: "<<endl;

b.enterPointCoordinate();

cout<<" The line segment is from: ";

a.displayPoint();

cout<<" to ";

b.displayPoint();

}

};

class PLA{

public: template <class A, class B, class C>

void pla5D(A& stPt, B& edPt, C& nwPt){

cout<<"For Starting Point: "<<endl; stPt.enterPointCoordinate();

cout<<"For End Point: "<<endl;.enterPointCoordinate();

cout<<"For New Point: "<<endl;.enterPointCoordinate();

if(nwPt.x\_cor==stPt.x\_cor && nwPt.y\_cor==stPt.y\_cor){

cout<<" The new point ("<<nwPt.x\_cor<<","<<nwPt.y\_cor<<") is the starting point.";

}else if(nwPt.x\_cor==edPt.x\_cor && nwPt.y\_cor==edPt.y\_cor){

cout<<" The new point ("<<nwPt.x\_cor<<","<<nwPt.y\_cor<<") is the terminal point.";

}

else if( ((edPt.y\_cor-stPt.y\_cor)/(edPt.x\_cor-stPt.x\_cor)) != ((nwPt.y\_cor-stPt.y\_cor) /

(nwPt.x\_cor-stPt.x\_cor)) ){

cout<<"The given three points:";

cout<<" ("<<stPt.x\_cor<<","<<stPt.y\_cor<<"), ("<<edPt.x\_cor<<","<<edPt.y\_cor<<")";

cout<<"and ("<<nwPt.x\_cor<<","<<nwPt.y\_cor<<") does not lie in the same line.";

}else{

if((nwPt.x\_cor>stPt.x\_cor || nwPt.y\_cor>stPt.y\_cor) && (nwPt.x\_cor<edPt.x\_cor ||

nwPt.y\_cor<edPt.y\_cor)){

cout<<" The new point ("<<nwPt.x\_cor<<","<<nwPt.y\_cor<<")";

cout<<" lies between in the given line segment.";

}else if(nwPt.x\_cor<stPt.x\_cor || nwPt.y\_cor<stPt.y\_cor){

cout<<" The new point ("<<nwPt.x\_cor<<","<<nwPt.y\_cor<<")";

cout<<" is behind the given line segment.";

}else {

cout<<" The new point ("<<nwPt.x\_cor<<","<<nwPt.y\_cor<<")";

cout<<" is beyond the given line segment.";

}

}

}

};

int main() {

int choice;

char cont;

cout<<" 1. Implementation of Point."<<endl;

cout<<" 2. Implementation of Line Segment."<<endl;

cout<<" 3. Test for 5-Dimension of PLA."<<endl;

cout<<" Enter the choice(1/2/3): ";

cin>>choice;

switch(choice){

case 1: Point p1;

p1.enterPointCoordinate();

cout<<" The point is: ";

p1.displayPoint();

break;

case 2: Point point1, point2;

Line line1;

line1.line<Point, Point>(point1,point2);

break;

case 3: Point startPt, endPt, newPt;

PLA pla;

pla.pla5D<Point,Point,Point>(startPt,endPt,newPt);

break;

default: cout<<"Invalid choice.";

}

return 0;

}