Assignment
Of
Computer Graphics

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BTech 5thrd Sem

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INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, RANCHI

(An Institution of National importance under act of Parliament)

(Ranchi - 834010), Jharkhand

Department of Computer Science and Engineering

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By Prithwiraj Samanta(2018UGCS002R)

ASSIGNMENT NO.1

Question

Design our national flag using set of lines generated by DDA or Bresenham line drawing algorithm

Program

```
#include<bits/stdc++.h>

#include<graphics.h>

using namespace std;

int main(){

   int gd=DETECT,gm;

  initgraph(&gd,&gm, NULL);

        //ORANGE RECTANGLE

        int x1=40,x2=300;

        for(int i=0;i<40;i++){

                int y1,y2;

                y1=y2=20+i;

                int dx=x2-x1;

                int dy=y2-y1;

                int p = 2*dy;
```

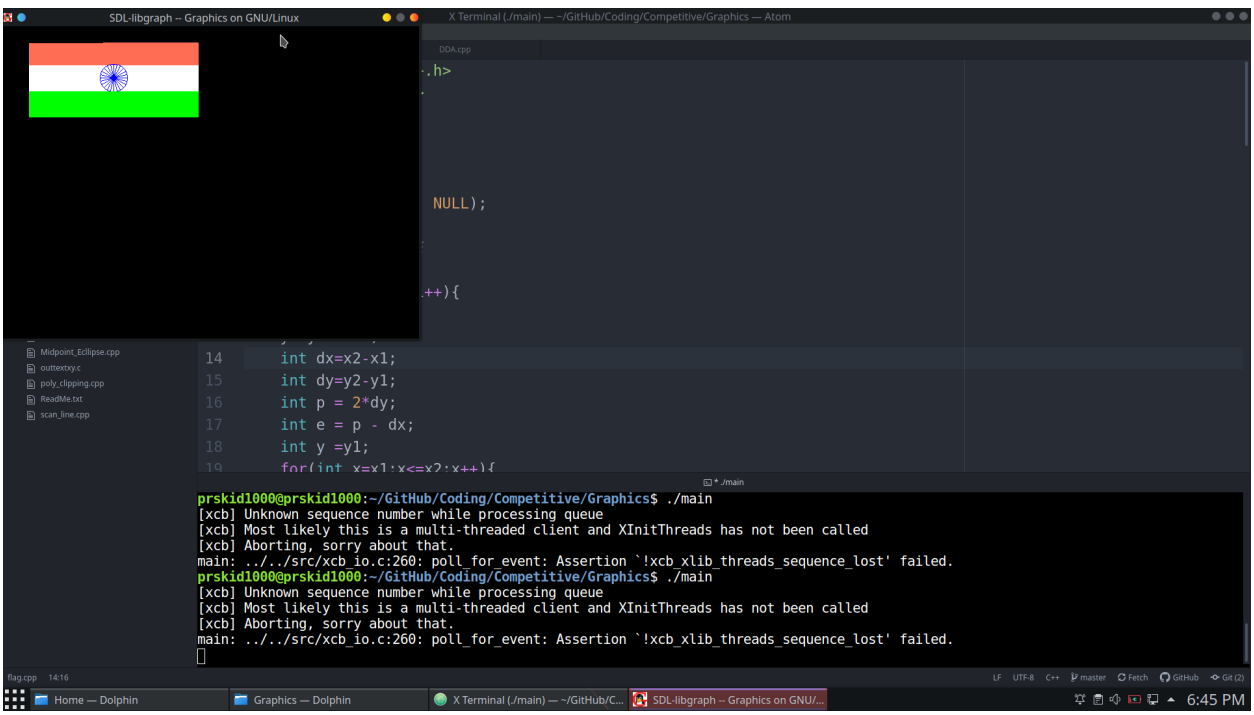
```
        int e = p - dx;
        int y =y1;
        for(int x=x1;x<=x2;x++){
                putpixel(x,y,12); //12 is orange
          //delay(1);
                e+=p;
                if(e>=0){
                        y++;
                        e-=2*dx;
                }
        }
}
//white RECTANGLE
for(int i=0;i<40;i++){
        int y1,y2;
        y1=y2=60+i;
        int dx=x2-x1;
        int dy=y2-y1;
        int p = 2*dy;
        int e = p - dx;
```

```
        int y =y1;
        for(int x=x1;x<=x2;x++){
                putpixel(x,y,WHITE);
        //      delay(1);
                e+=p;
                if(e>=0){
                        y++;
                        e-=2*dx;
                }
        }
}
float a=170;        //center
float b=79;  //center
int r=21;     //radius
setcolor(BLUE);
circle(a,b,r);
float PI = 3.14;
//spokes
for(int i=0;i<=360;i=i+15)
{
```

```
        int x=r*cos(i*PI/180);
        int y=r*sin(i*PI/180);
        line(a,b,a+x,b-y);
}
//GREEN RECTANGLE
for(int i=0;i<40;i++){
        int y1,y2;
        y1=y2=100+i;
        int dx=x2-x1;
        int dy=y2-y1;
        int p = 2*dy;
        int e = p - dx;
        int y =y1;
        for(int x=x1;x<=x2;x++){
                putpixel(x,y,GREEN);
        //      delay(1);
                e+=p;
                if(e>=0){
                        y++;
                        e-=2*dx;
```

```
                }
            }
        }
        delay(10000);
}.
```

Output



ASSIGNMENT NO.2

Question

Design a solar planet system using a set of circles generated by midpoint circle generation algorithm

Program

```
#include<bits/stdc++.h>

#include<graphics.h>

using namespace std;

void circlehe(int c,int r,int e,int f){

    int x=0,y;

    float d;

    y = r ; d = 1.25 -r;

    do

    {

        putpixel(e+x,f+y,c);

        putpixel(e+x,f-y,c);

        putpixel(e-x,f+y,c);

        putpixel(e-x,f-y,c);

        putpixel(e+y,f+x,c);
```

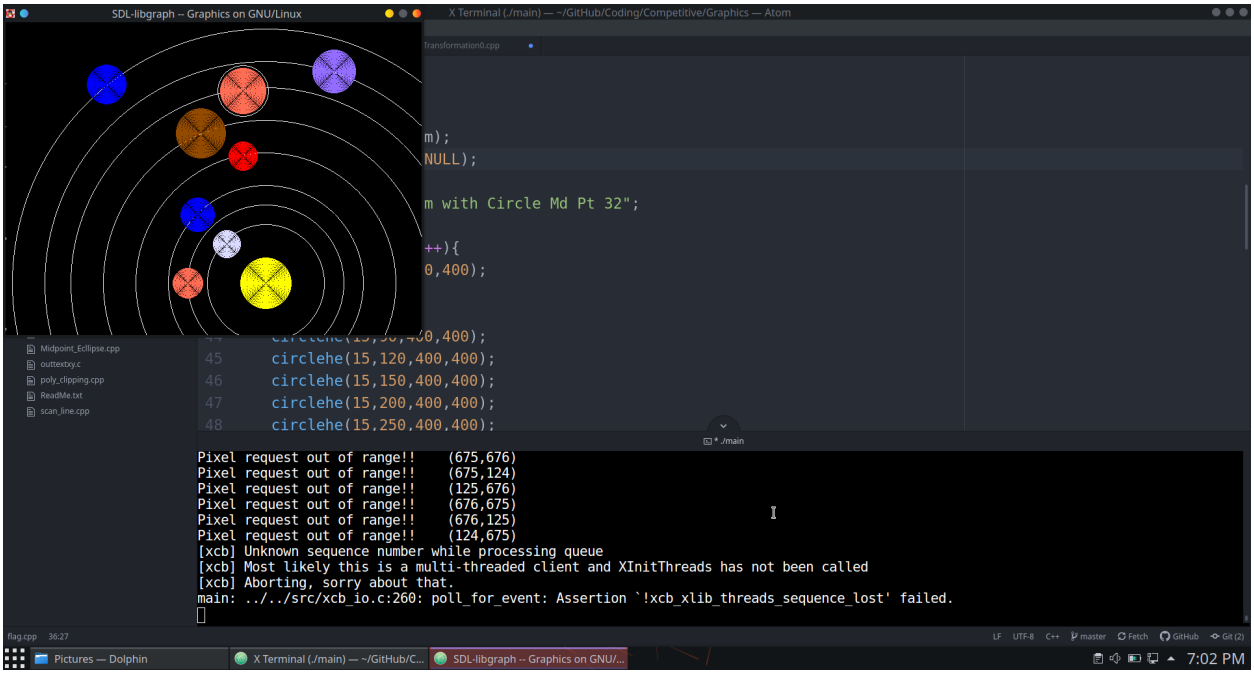
```
        putpixel(e+y,f-x,c);
        putpixel(e-y,f+x,c);
        putpixel(e-y,f-x,c);
        if(d<0)
        {
            x++;
            y= y;
            d= d+2*x+2;
                }
        else
        {
            x++;
            y--;
            d = d+2*x-2*y+1;
        }
         }while(x<y);
}
int main(){


         int gd=DETECT,gm;
```

```
  detectgraph(&gd,&gm);
  initgraph(&gd,&gm,NULL);

        cout<<"Solar System with Circle Md Pt 32";
        //sun
        for(int i=0;i<40;i++){
                circlehe(14,i,400,400);
        }
         //9 circles
         circlehe(15,90,400,400);
         circlehe(15,120,400,400);
         circlehe(15,150,400,400);
         circlehe(15,200,400,400);
         circlehe(15,250,400,400);
         circlehe(15,300,400,400);
         circlehe(15,340,400,400);
         circlehe(15,390,400,400);
//      for(int i=1;i<=8;i++){
//              circlehe(15,30*(i+2),400,400);
//      }
```

```
 //Mercury 22r grey color
for(int i=0;i<=21;i++)
 circlehe(7,i,340,340);

 //Venus  23 12 light red
for(int i=0;i<=23;i++)
    circlehe(12,i,280,400);

 //Earth blue=1 r=25
for(int i=0;i<=26;i++)
    circlehe(1,i,295,295);

//Mars red=4 r = 22
for(int i=0;i<=22;i++)
    circlehe(4,i,365,205);

//Jupiter brown 38 radius
for(int i=0;i<=38;i++)
    circlehe(6,i,300,170);
//Saturn orange 35
```

```
        for(int i=0;i<=35;i++)
            circlehe(12,i,365,105);
//          //ring
        circlehe(15,39,365,105);
//      //uranus 9 33
        for(int i=0;i<=33;i++)
            circlehe(9,i,505,75);
//      //neptune 1 30
        for(int i=0;i<=30;i++)
                circlehe(1,i,155,95);
//
        getch();
    return 0;
}
```

Output


SDL-libgraph -- Graphics on GNU/Linux
X Terminal (./main) — ~/GitHub/Coding/Competitive/Graphics — Atom
Transformation0.cpp
m);
NULL);
m with Circle Md Pt 32";
++){
0,400);
Midpoint_Ecllipse.cpp
outtextxy.c
poly_clipping.cpp
ReadMe.txt
scan_line.cpp
circlehe(15,120,400,400);
circlehe(15,150,400,400);
circlehe(15,200,400,400);
circlehe(15,250,400,400);
./main
Pixel request out of range!! (675,676)
Pixel request out of range!! (675,124)
Pixel request out of range!! (125,676)
Pixel request out of range!! (676,675)
Pixel request out of range!! (676,125)
Pixel request out of range!! (124,675)
[xcb] Unknown sequence number while processing queue
[xcb] Most likely this is a multi-threaded client and XInitThreads has not been called
[xcb] Aborting, sorry about that.
main: ../../src/xcb_io.c:260: poll_for_event: Assertion `!xcb_xlib_threads_sequence_lost' failed.
flag.cpp 36:27
LF UTF-8 C++ master Fetch GitHub Git (2)
Pictures — Dolphin
X Terminal (./main) — ~/GitHub/C...
SDL-libgraph -- Graphics on GNU/...
7:02 PM

ASSIGNMENT NO.3

Question

Design a sky consisting of clouds using set of ellipses or circles generated by midpoint ellipse generation algorithm

Program

Draw a line using DDA algori

```
#include<bits/stdc++.h>

#include<graphics.h>

using namespace std;

void sky(){

        int x1=20,x2=420;

        for(int i=20;i<=420;i++){

                int y1,y2;

                y1=y2=i;

                int dx=x2-x1;

                int dy=y2-y1;

                int p = 2*dy;

                int e = p - dx;

                int y =y1;
```

```
		for(int x=x1;x<=x2;x++){
			putpixel(x,y,LIGHTBLUE);
		//	delay(1);
			e+=p;
			if(e>=0){
				y++;
				e-=2*dx;
			}
		}
	}
}
void ellipsehere(float rx,float ry,int e,int f){
	float x=0,y=ry;
	float d1=(ry*ry) - (rx*rx*ry) + (0.25*rx*rx);
	float dy =2*rx*rx*y, dx=2*ry*ry*x;
	do{
		putpixel(e+x,y+f,WHITE);
		putpixel(e-x,y+f,WHITE);
		putpixel(e+x,f-y,WHITE);
		putpixel(e-x,f-y,WHITE);
```

```
            if(d1<0){
                x=x+1;
                dx+=2*ry*ry;
                d1=d1+dx+ry*ry;
            }
            else{
                x=x+1;
                y=y-1;
                dx+=2*ry*ry;
                dy-=2*rx*rx;
                d1=d1+dx-dy+ry*ry;
            }
        } while(dx<dy);
        float d2=  ((ry * ry) * ((x + 0.5) * (x + 0.5))) +  ((rx * rx) * ((y - 1) * (y -
1))) - (rx * rx * ry * ry);
            do{
            putpixel(e+x,y+f,WHITE);
            putpixel(e-x,y+f,WHITE);
            putpixel(e+x,-y+f,WHITE);
            putpixel(e-x,-y+f,WHITE);
```

```
                if(d2>0){
                        y=y-1;
                        dy-=2*rx*rx;
                        d2=d2-dy+rx*rx;
                }
                else{
                        x=x+1;
                        y=y-1;
                        dx+=2*ry*ry;
                        dy-=2*rx*rx;
                        d2=d2+dx-dy+rx*rx;
                }
        } while(y>0);
}
void circlehe(int c,int r,int e,int f){
        int x=0,y;
    float d;
    y = r ; d = 1.25 -r;
    do
    {
```

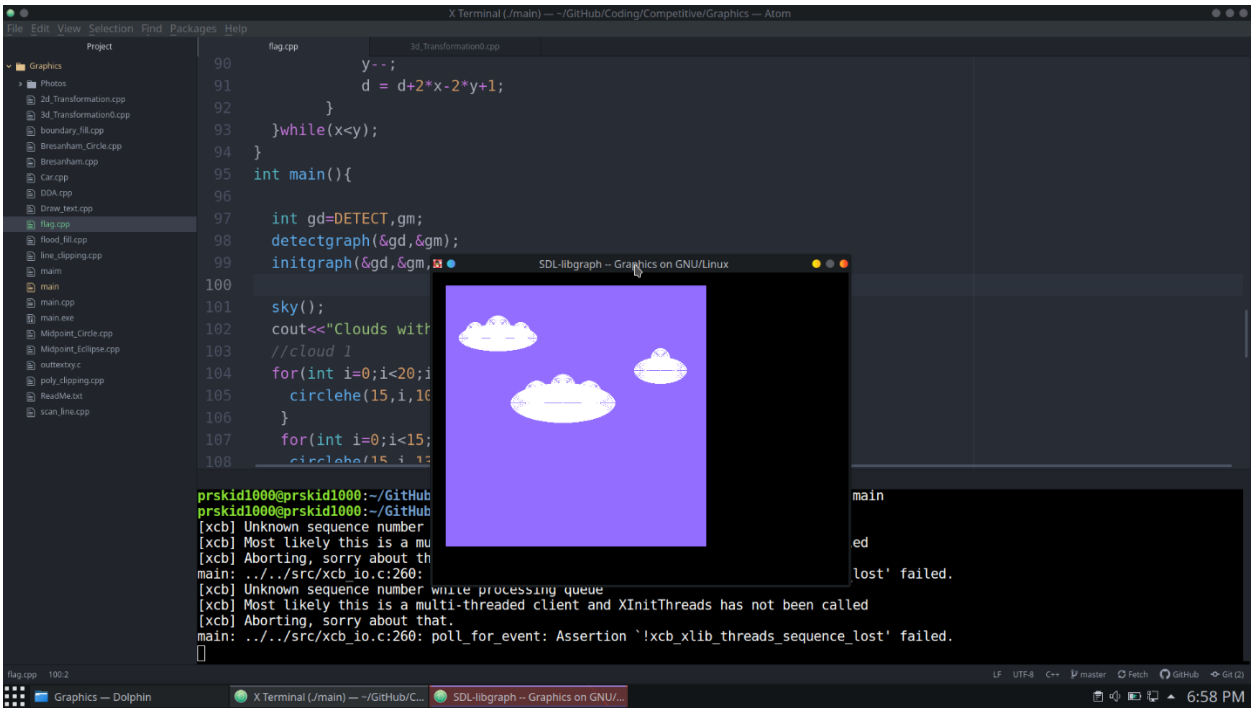
```
putpixel(e+x,f+y,c);
putpixel(e+x,f-y,c);
putpixel(e-x,f+y,c);
putpixel(e-x,f-y,c);
putpixel(e+y,f+x,c);
putpixel(e+y,f-x,c);
putpixel(e-y,f+x,c);
putpixel(e-y,f-x,c);
if(d<0)
{
    x++;
    y= y;
    d= d+2*x+2;
        }
else
{
    x++;
    y--;
    d = d+2*x-2*y+1;
}
```

```
        }while(x<y);
}
int main(){

        int gd=DETECT,gm;
        detectgraph(&gd,&gm);
  initgraph(&gd,&gm,NULL);

        sky();
        cout<<"Clouds with Circle and Ellipse Md Pt 32";
        //cloud 1
        for(int i=0;i<20;i++){
                circlehe(15,i,100,85);
         }
         for(int i=0;i<15;i++){
                circlehe(15,i,135,90);
         }
         for(int i=0;i<15;i++){
                circlehe(15,i,65,90);
         }
```

```
 int i=60,j=20;
 for(;i>=0&&j>=0;i--,j--)
 ellipsehere(i,j,100,100);

//cloud 2

for(int i=0;i<20;i++){
        circlehe(15,i,200,175);
 }
for(int i=0;i<20;i++){
        circlehe(15,i,160,185);
 }
for(int i=0;i<20;i++){
        circlehe(15,i,240,185);
 }
 i=80,j=30;
for(;i>=0&&j>=0;i--,j--)
   ellipsehere(i,j,200,200);

//cloud 3
```

```
        for(int i=0;i<15;i++){
                circlehe(15,i,350,130);
        }
        i=40,j=20;
        for(;i>=0&&j>=0;i--,j--)
           ellipsehere(i,j,350,150);


        getch();
    return 0;
}
```

Output


X Terminal (./main) — ~/GitHub/Coding/Competitive/Graphics — Atom
File Edit View Selection Find Packages Help
Project
flag.cpp
3d_Transformation0.cpp
Graphics
Photos
2d_Transformation.cpp
3d_Transformation0.cpp
boundary_fill.cpp
Bresanham_Circle.cpp
Bresanham.cpp
Car.cpp
DDA.cpp
Draw_text.cpp
flag.cpp
flood_fill.cpp
line_clipping.cpp
maim
main
main.cpp
main.exe
Midpoint_Circle.cpp
Midpoint_Ecllipse.cpp
outtextxy.c
poly_clipping.cpp
ReadMe.txt
scan_line.cpp
90 y--;
91 d = d+2*x-2*y+1;
92 }
93 }while(x<y);
94 }
95 int main(){
96
97 int gd=DETECT,gm;
98 detectgraph(&gd,&gm);
99 initgraph(&gd,&gm,
100
101 sky();
102 cout<<"Clouds with
103 //cloud 1
104 for(int i=0;i<20;i
105 circlehe(15,i,16
106 }
107 for(int i=0;i<15;
SDL-libgraph -- Graphics on GNU/Linux
prskid1000@prskid1000:~/GitHub
prskid1000@prskid1000:~/GitHub
[xcb] Unknown sequence number
[xcb] Most likely this is a mu
[xcb] Aborting, sorry about th
main: ../../src/xcb_io.c:260:
[xcb] Unknown sequence number while processing queue
[xcb] Most likely this is a multi-threaded client and XInitThreads has not been called
[xcb] Aborting, sorry about that.
main: ../../src/xcb_io.c:260: poll_for_event: Assertion `!xcb_xlib_threads_sequence_lost' failed.
Graphics — Dolphin
X Terminal (./main) — ~/GitHub/C...
SDL-libgraph -- Graphics on GNU/...
6:58 PM

ASSIGNMENT NO.4

Question

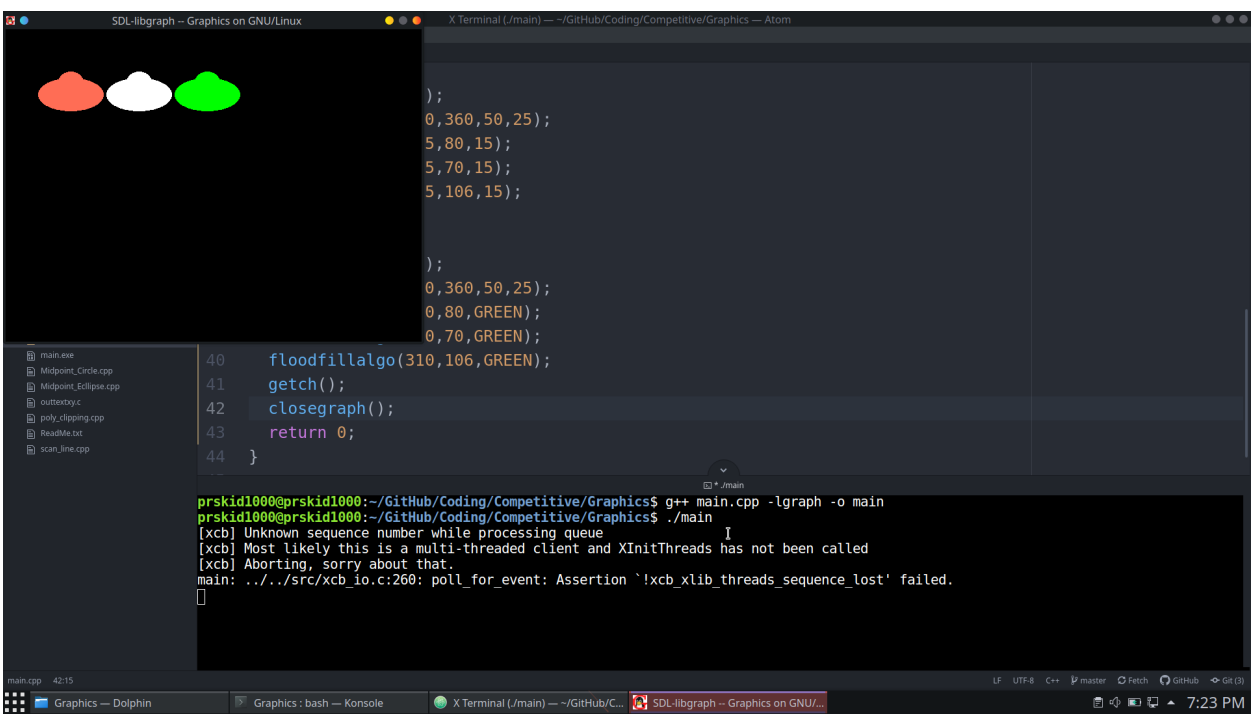
Draw 3 clouds by using graphics functions and fill the 3 clouds with saphron, white and green colors by using flood fill Algorithm.

Program

```
#include<bits/stdc++.h>
#include<graphics.h>
using namespace std;
void floodfillalgo(int x,int y,int c)
{
        if(getpixel(x,y)==c)
        return;
        putpixel(x,y,c);
        floodfillalgo(x+1,y,c);
        floodfillalgo(x-1,y,c);
        floodfillalgo(x,y+1,c);
        floodfillalgo(x,y-1,c);
}
int main()
{
        int gd=DETECT,gm;
  detectgraph(&gd,&gm);
  initgraph(&gd,&gm,NULL);

        //Saffron Cloud
        setcolor(12);
        circle(100,85,20);
        ellipse(100, 100, 0, 360, 50, 25);
        floodfillalgo(90,80,12);
        floodfillalgo(90,70,12);
        floodfillalgo(80,106,12);
```

```
        //White Cloud
        setcolor(15);
        circle(205,85,20);
        ellipse(205,100,0,360,50,25);
        floodfillalgo(205,80,15);
        floodfillalgo(205,70,15);
        floodfillalgo(205,106,15);
        //Green Cloud
        setcolor(GREEN);
        circle(310,85,20);
        ellipse(310,100,0,360,50,25);
        floodfillalgo(310,80,GREEN);
        floodfillalgo(310,70,GREEN);
        floodfillalgo(310,106,GREEN);
        getch();
        closegraph();
        return 0;
}
```

Output



ASSIGNMENT NO.5

Question

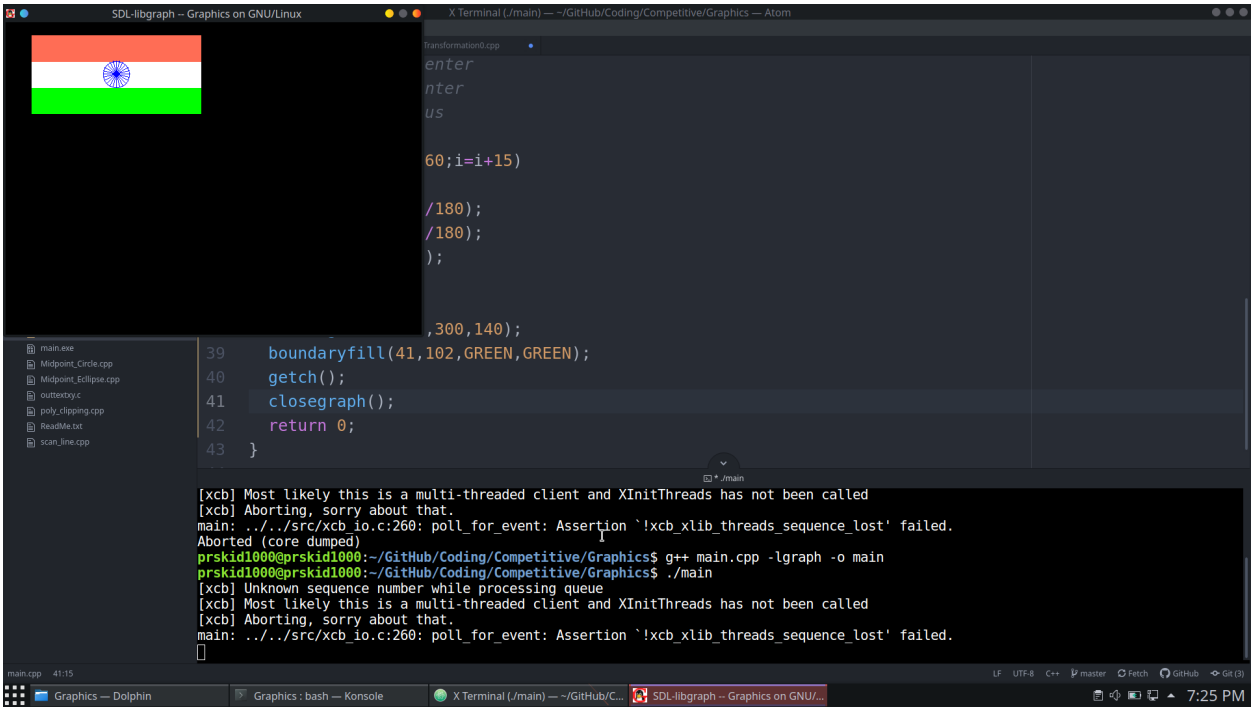
Draw our national flag by using graphics functions and fill appropriate colors by using boundary fill algorithm

Program

```
#include<bits/stdc++.h>
#include<graphics.h>
using namespace std;
void boundaryfill(int x,int y,int boundarycolor,int newcolor)
{
        if(getpixel(x,y)==boundarycolor || getpixel(x,y)==newcolor) return;
        putpixel(x,y,newcolor);
        boundaryfill(x+1,y,boundarycolor,newcolor);
        boundaryfill(x-1,y,boundarycolor,newcolor);
        boundaryfill(x,y+1,boundarycolor,newcolor);
        boundaryfill(x,y-1,boundarycolor,newcolor);
}
int main()
{
        int gd=DETECT,gm;
  detectgraph(&gd,&gm);
  initgraph(&gd,&gm,NULL);

        setcolor(LIGHTRED);
        rectangle(40,20,300,60);
        boundaryfill(41,21,LIGHTRED,LIGHTRED);
        setcolor(WHITE);
        rectangle(40,61,300,100);
        boundaryfill(41,62,WHITE,WHITE);
```

```
        setcolor(BLUE);
        circle(170,80,20);
        float a=170; //center
        float b=79; //center
        int r=21; //radius
        float PI = 3.14;
        for(int i=0;i<=360;i=i+15)
        {
        int x=r*cos(i*PI/180);
        int y=r*sin(i*PI/180);
        line(a,b,a+x,b-y);
        }
        setcolor(GREEN);
        rectangle(40,101,300,140);
        boundaryfill(41,102,GREEN,GREEN);
        getch();
        closegraph();
        return 0;
}
```

Output



ASSIGNMENT NO.6

Question

Draw a Mickey Mouse shape by using DDA, circle generation algorithm

Program

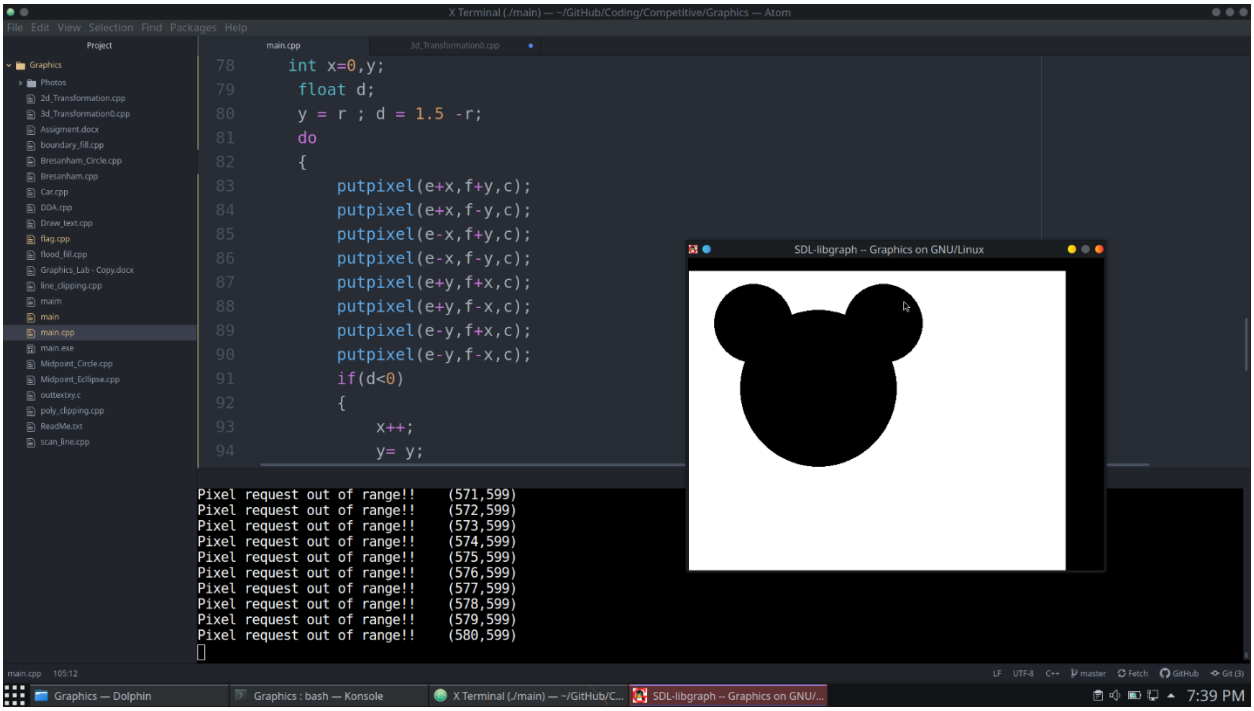
```
#include<bits/stdc++.h>
#include<graphics.h>
using namespace std;
void boundaryfill(int x,int y,int boundarycolor,int newcolor){
        if(getpixel(x,y)==boundarycolor || getpixel(x,y)==newcolor) return;
        putpixel(x,y,newcolor);
        boundaryfill(x+1,y,boundarycolor,newcolor);
        boundaryfill(x-1,y,boundarycolor,newcolor);
        boundaryfill(x,y+1,boundarycolor,newcolor);
        boundaryfill(x,y-1,boundarycolor,newcolor);
}
void background(){
   int x1=20,x2=600;
        for(int i=20;i<600;i++){
                int y1,y2;
                y1=y2=i;
                int dx=x2-x1;
                int dy=y2-y1;
                int steps;
                if(abs(dx)>abs(dy)) steps = abs(dx);
                else steps = abs(dy);
                int xinc = dx/steps;
                int yinc = dy/steps;
                int x=0,y=i;
                x+=xinc;
                y+=yinc;
```

```
		for(int i=0;i<steps;i++){
			putpixel(x,y,WHITE);
		  //delay(1);
			x+=xinc;
			y+=yinc;
		}
	}
}
void ellipsehere(float rx,float ry,int e,int f,int color){
	float x=0,y=ry;
	float d1=(ry*ry) - (rx*rx*ry) + (0.25*rx*rx);
	float dy =2*rx*rx*y, dx=2*ry*ry*x;
	do{
		putpixel(e+x,y+f,color);
		putpixel(e-x,y+f,color);
		putpixel(e+x,f-y,color);
		putpixel(e-x,f-y,color);
		if(d1<0){
			x=x+1;
			dx+=2*ry*ry;
			d1=d1+dx+ry*ry;
		}
		else{
			x=x+1;
			y=y-1;
			dx+=2*ry*ry;
			dy-=2*rx*rx;
			d1=d1+dx-dy+ry*ry;
		}
	} while(dx<dy);
	float d2=  ((ry * ry) * ((x + 0.5) * (x + 0.5))) +  ((rx * rx) * ((y - 1) * (y -
1))) - (rx * rx * ry * ry);
		do{
		putpixel(e+x,y+f,color);
		putpixel(e-x,y+f,color);
		putpixel(e+x,-y+f,color);
		putpixel(e-x,-y+f,color);
```

```
                if(d2>0){
                        y=y-1;
                        dy-=2*rx*rx;
                        d2=d2-dy+rx*rx;
                }
                else{
                        x=x+1;
                        y=y-1;
                        dx+=2*ry*ry;
                        dy-=2*rx*rx;
                        d2=d2+dx-dy+rx*rx;
                }
        } while(y>0);
}
void circlehe(int r,int e,int f,int c){
         int x=0,y;
    float d;
    y = r ; d = 1.5 -r;
    do
    {
        putpixel(e+x,f+y,c);
        putpixel(e+x,f-y,c);
        putpixel(e-x,f+y,c);
        putpixel(e-x,f-y,c);
        putpixel(e+y,f+x,c);
        putpixel(e+y,f-x,c);
        putpixel(e-y,f+x,c);
        putpixel(e-y,f-x,c);
        if(d<0)
        {
            x++;
            y= y;
            d= d+2*x+2;
                }
        else
        {
            x++;
```

```
            y--;
            d = d+2*x-2*y+1;
        }
        }while(x<y);
}
int main(){
        int gd=DETECT,gm;
  detectgraph(&gd,&gm);
  initgraph(&gd,&gm,NULL);
        background();
        circlehe(60,100,100,BLACK);
        boundaryfill(80,80,BLACK,BLACK);
        circlehe(60,300,100,BLACK);
        boundaryfill(280,80,BLACK,BLACK);
        circlehe(120,200,200,BLACK);
        boundaryfill(180,180,BLACK,BLACK);
        delay(100);
        getch();
        return 0;
}
```

Output


X Terminal (./main) — ~/GitHub/Coding/Competitive/Graphics — Atom
File Edit View Selection Find Packages Help
Project
main.cpp
3d_Transformation0.cpp
Graphics
Photos
2d_Transformation.cpp
3d_Transformation0.cpp
Assigment.docx
boundary_fill.cpp
Bresanham_Circle.cpp
Bresanham.cpp
Car.cpp
DDA.cpp
Draw_text.cpp
flag.cpp
flood_fill.cpp
Graphics_Lab - Copy.docx
line_clipping.cpp
main
main
main.cpp
main.exe
Midpoint_Circle.cpp
Midpoint_Ecllipse.cpp
outtextxy.c
poly_clipping.cpp
ReadMe.txt
scan_line.cpp
78 int x=0,y;
79 float d;
80 y = r ; d = 1.5 -r;
81 do
82 {
83 putpixel(e+x,f+y,c);
84 putpixel(e+x,f-y,c);
85 putpixel(e-x,f+y,c);
86 putpixel(e-x,f-y,c);
87 putpixel(e+y,f+x,c);
88 putpixel(e+y,f-x,c);
89 putpixel(e-y,f+x,c);
90 putpixel(e-y,f-x,c);
91 if(d<0)
92 {
93 x++;
94 y= y;
SDL-libgraph -- Graphics on GNU/Linux
Pixel request out of range!! (571,599)
Pixel request out of range!! (572,599)
Pixel request out of range!! (573,599)
Pixel request out of range!! (574,599)
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Pixel request out of range!! (579,599)
Pixel request out of range!! (580,599)
main.cpp 105:12
LF UTF-8 C++ master Fetch GitHub Git (3)
Graphics — Dolphin
Graphics : bash — Konsole
X Terminal (./main) — ~/GitHub/C...
SDL-libgraph -- Graphics on GNU/...
7:39 PM