8. Develop a menu driven program to animate a flag using Bezier Curve algorithm

(.cpp)

```
#include<GL/glut.h>
#include<stdio.h>
#include<stdlib.h>
#include<math.h>
#define pi 3.1416
static float th = 0;
GLint nCP = 4, nBCP = 20;

typedef struct wc
{
	GLfloat x, y, z;
};

void bino(GLint n, GLint* c)
{
	GLint k, j;
	for (k = 0; k <= n; k++)
	{
		c[k] = 1;
		for (j = n; j >= k + 1; j--)
			c[k] *= j;
		for (j = n - k; j >= 2; j--)
			c[k] /= j;
	}
}
void computeBezPt(GLfloat u, wc* bP, GLint nCP, wc* cP, GLint* c)
{
	GLint k, n = nCP - 1;
	GLfloat BEZ;
	bP->x = bP->y = bP->z = 0;
	for (k = 0; k < nCP; k++)
	{
		BEZ = c[k] * pow(u, k) * pow(1 - u, n - k);
		bP->x += cP[k].x * BEZ;
		bP->y += cP[k].y * BEZ;
		bP->z += cP[k].z * BEZ;
	}
}

void bezier(wc * cP, GLint nCP, GLint nBCP)
{
	wc bCP;
	GLfloat u;
	GLint* c, k;
	c = new GLint[nCP];
	bino(nCP - 1, c);
	glBegin(GL_LINE_STRIP);
	for (k = 0; k <= nBCP; k++)
	{
		u = GLfloat(k) / GLfloat(nBCP);
		computeBezPt(u, &bCP, nCP, cP, c);
		glVertex2f(bCP.x, bCP.y);
	}
	glEnd();
	delete[]c;
}
void display()
{
```

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	glClearColor(0, 0, 0, 1);
}
void draw_and_animate()
{
	wc cP[4] = { { 20,100,0 },{ 30,110,0 },{ 50,90,0 },{ 60,100,0 } };
	cP[1].x += 10 * sin(th * pi / 180);
	cP[1].y += 5 * sin(th * pi / 180);
	cP[2].x -= 10 * sin((th + 30) * pi / 180);
	cP[2].y -= 10 * sin((th + 30) * pi / 180);
	cP[3].x -= 4 * sin(th * pi / 180);
	cP[3].x += sin((th - 30) * pi / 180);
	th += 0.1;
	glClear(GL_COLOR_BUFFER_BIT);
	glColor3f(1, 1, 1);
	glPushMatrix();
	glLineWidth(5);
	glColor3f(255 / 255, 153 / 255.0, 51 / 255.0); //saffron

		for (int i = 0; i < 8; i++)
		{
			glTranslatef(0, -.8, 0);
			bezier(cP, nCP, nBCP);
		}
	glColor3f(1, 1, 1); //white
	for (int i = 0; i < 8; i++)
	{
		glTranslatef(0, -.8, 0);
		bezier(cP, nCP, nBCP);
	}
	glColor3f(19 / 255.0, 136 / 255.0, 8 / 255.0); //green
	for (int i = 0; i < 8; i++)
	{
		glTranslatef(0, -.8, 0);
		bezier(cP, nCP, nBCP);
	}
	glPopMatrix();
	glColor3f(.7, .5, .3); //flag pole
	glLineWidth(5);
	glBegin(GL_LINES);
	glVertex2f(20, 100);
	glVertex2f(20, 40);
	glEnd();
	glFlush();
	glutPostRedisplay();
	glutSwapBuffers();
}
void reshape(GLint w, GLint h)
{
	glViewport(0, 0, w, h);
	glMatrixMode(GL_PROJECTION);
	glLoadIdentity();
	gluOrtho2D(0, 150, 0, 150);
	glClear(GL_COLOR_BUFFER_BIT);
}

void menu(int id)
{
	switch (id)
	{
	case 1:glutIdleFunc(draw_and_animate);
		break;
	case 2:glutIdleFunc(NULL);
```

```
                break;
        }
        glutPostRedisplay();
}
int main(int argc, char** argv)
{
        glutInit(&argc, argv);
        glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGB);
        glutInitWindowPosition(50, 50);
        glutInitWindowSize(640, 840);
        glutCreateWindow("Bezier Curve");
        glutReshapeFunc(reshape);
        glutDisplayFunc(display);
        glClearColor(0, 0, 0, 1);
        glFlush();
        glutCreateMenu(menu);
        glutAddMenuEntry("Draw and animate", 1);
        glutAddMenuEntry("Stop animation", 2);
        glutAttachMenu(GLUT_LEFT_BUTTON);
        glutMainLoop();
        return 0;
}
```