CS460 - Homework 5

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Theory:

Homework-5

1.) $P(u) = au^3 + bu^2 + cu + d$

$P'(0) = d$

$P(1) = a+b+c+d$

$P'(0) = c$

$P'(1) = 3a+2b+c$

$\Rightarrow$

$a = 2P(0) - 2P(1) + P'(0) + P'(1)$

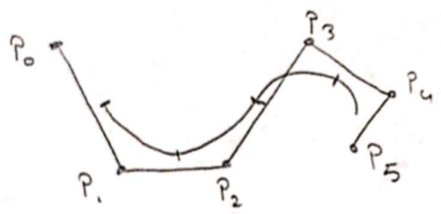
$b = -3P(0) + 3P(1) - 2P'(0)$

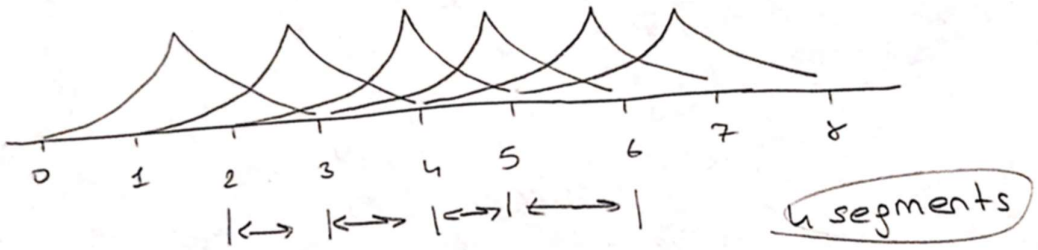
$c = P'(0)$

$d = P(0)$

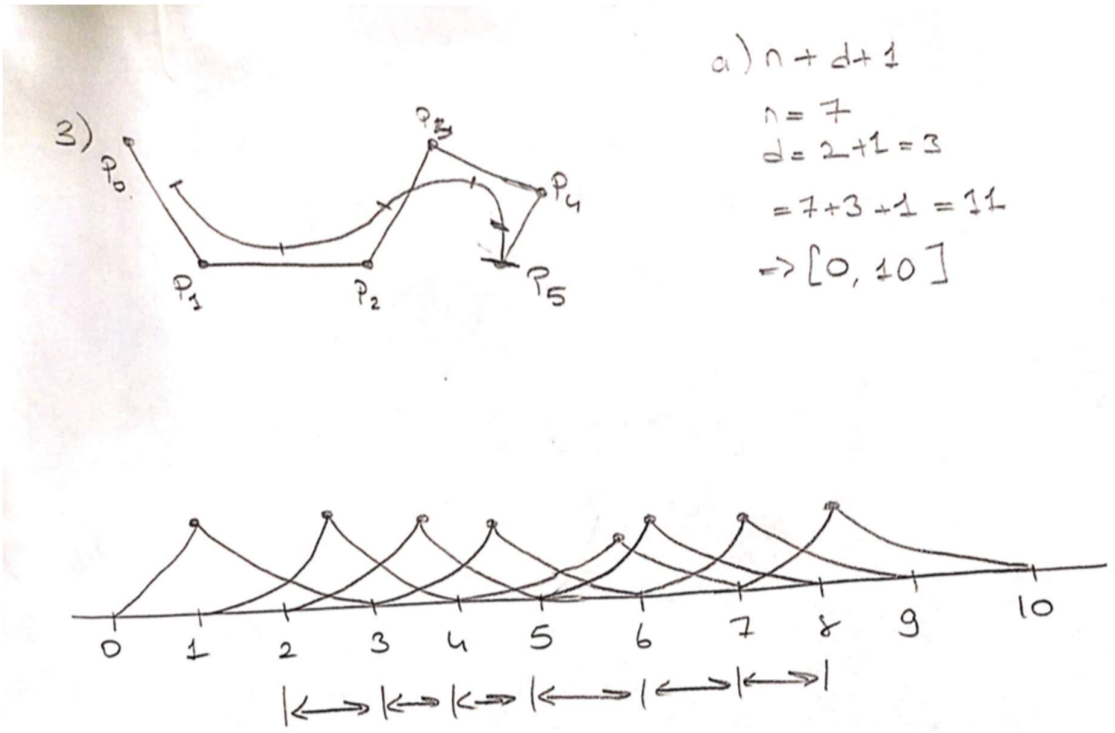
$$M_H = \begin{bmatrix} 2 & -2 & 1 & 1 \\ -3 & 3 & -2 & -1 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

2.)





4 segments



Problem Statement:

1. Bezier surface deformation:

Creating a 3D surface and deforming the surface by using 16 control points. To display the surface correctly, back-face removal algorithm is required.

2. Surface Shading Generation:

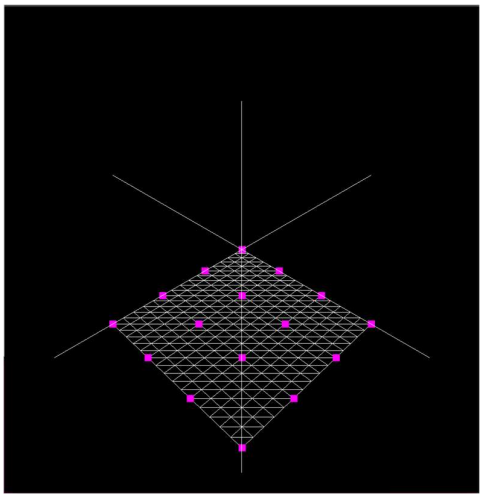
Defining a point light source, generate the shading effects surface material parameters and viewing position.

3. "S" Character Creation Using Uniform B-Spline Surface:

Creating a S-shape by b-spline algorithm.

4. Geometric Model Loading and Drawing using Shaders:

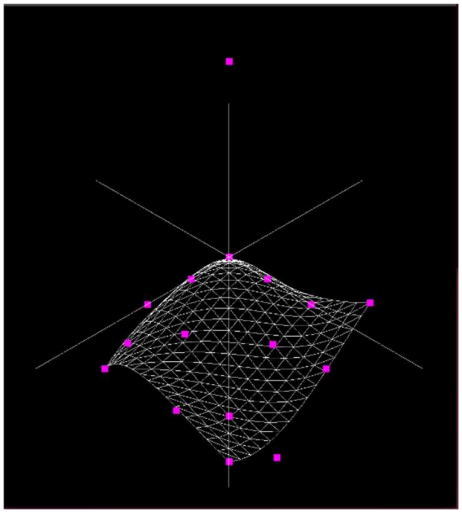
Loading and adding texture to 3D model. Then shading it with a light source.



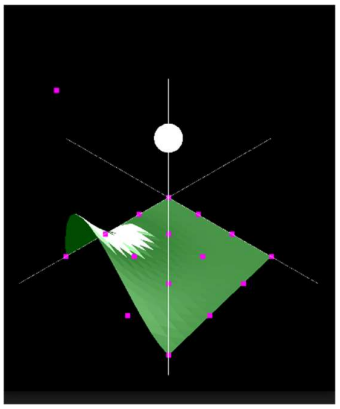
Algorithm Design:

1. I coded triangles to create a surface. Every time the control points changes I re calculate the new points to create triangles by using Bezier algorithm. In the beginning of the program I create 16 control points. Then by using these control points I generate 400 points to generate a triangle that can create a surface. Every time the position of the control point changes I re calculate these 400 points to re-create the triangle.

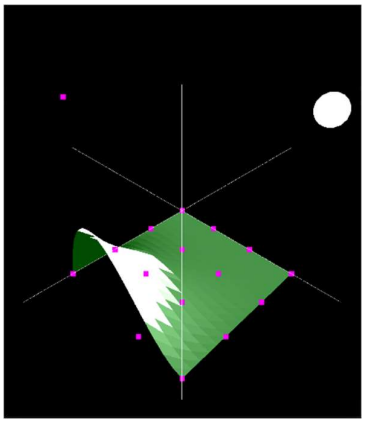
To move the control points select control point from the menu then by using up, down, left, right, "N" and "M" buttons you can change their position.

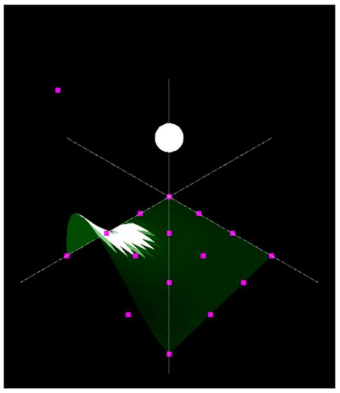


2. To create shading I first create a glMaterialf with green color. I also changed the surface as a uniform when the flat or smooth option selected. Then by using glLightf I gave shade to the surface.

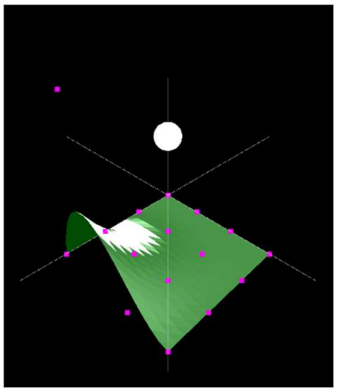


To change the position of light source use for y axis i-k for x axis o-p for z axis j-l buttons.

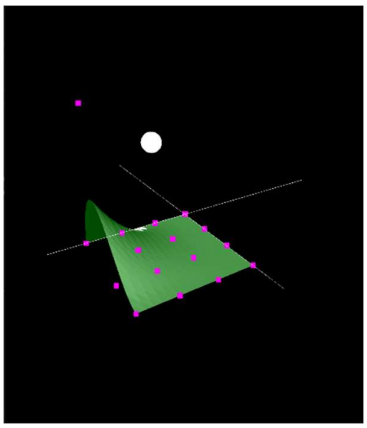




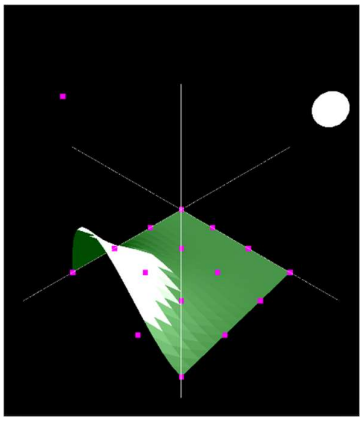
To change the diffuse reflection use t-g buttons.



To change the specular highlight use f-h buttons.



To change the camera position use for x axis w-s for y axis use a-d buttons.



To change the shine use the c-v buttons

3. & 4. Because they were extra points I didn't do these problems.

To Run Enter:

make

./main