CZ2003 Computer Graphics and Visualization

Report for Lab 1

In this report creation of objects using polygons is described with respect to the attached files consisting of hexagon, cube and hypercube with emphasis on the last.

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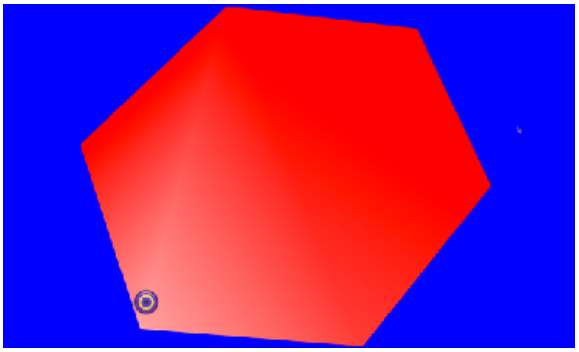
Description of files

In this lab I have created 3 objects consisting of polygons. These objects are: Hexagon, Cube and Hypercube. To see the code for an object see file for the corresponding section.

Hexagon

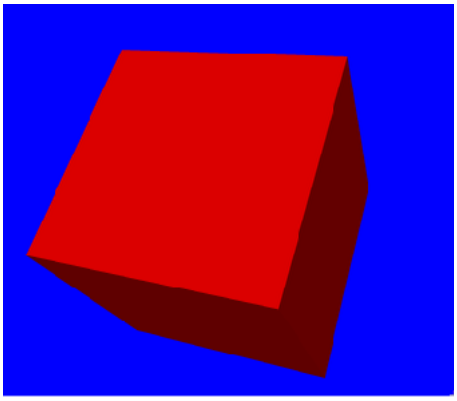
The object has 6 vertices of which 2 are placed on the first axis of the coordinate system. The rest have either positive or negative value of 0.5 on the first axis to create a hexagon. Then the edges are simply set to create the hexagon. Since this hexagon is 2D it may not be visible unless it is viewed from the correct angles since any polygons viewed from the wrong sides are hidden.



A picture of the polygon viewed from a correct angle

Cube

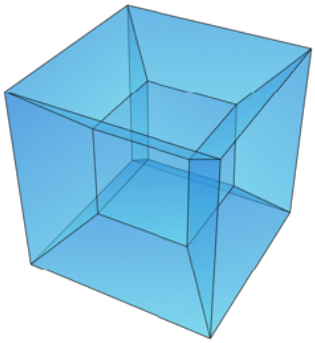
The cube consists of 8 vertices. The edges create a total of 6 square which make up the cube. Since this object should be perceived as solid its polygons must be facing outward such that no matter where the users looks the object will be a interpreted as a cube.



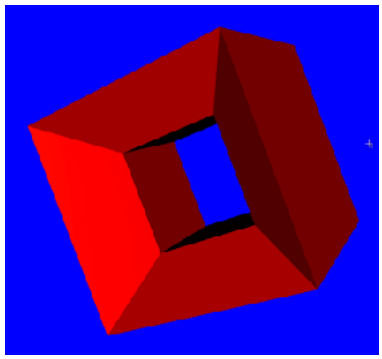
The cube. As said we can see it has three sides.

Hypercube

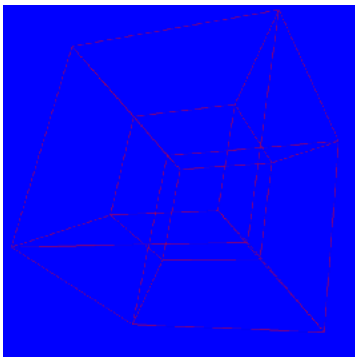
Hypercubes can be illustrated in multiple ways. Since proper hypercube illustrations is beyond the scope of this lab my hypercube is inspired by a Torus by allowing sight on two sides while blocking it on the others. To achieve this 16 vertices were used and 16 square or square-like polygons.



Appearence of a typical hypercube



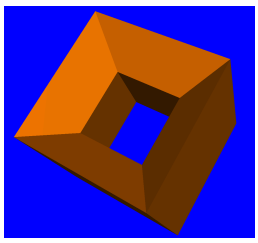
My hypercube



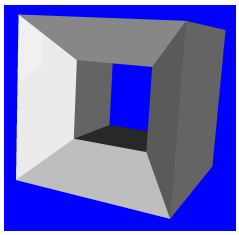
Wireframe of my hypercube

Remark regarding diffuse color

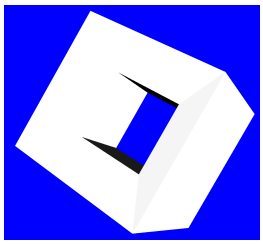
In this section we use the hypercube to describe how the diffuse color is set. Since diffuse color is set using floats between 0 to 1 the values can be seen as color percentages. Setting $\mathrm{R} = 1$ and $\mathrm{B} = 0.5$ would yield an orange color and similar. However if the values are set above or bellow the stated range it will additionally affect the illumination and thus the realism of the object. This is a result of a normalisation of the values which *washes* away color in the process. Additionally, when all colours are set bellow zero the object becomes dark as there in an absence of reflecting light.



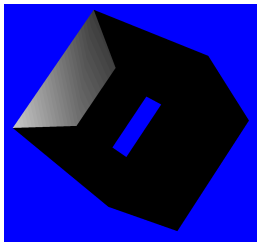
$(\mathrm{R,B,G}) = (1,\ 0.5,\ 0)$



$(\mathrm{R,G,B}) = (1,\ 1,\ 1)$



$(\mathrm{R,G,B}) = (3,\ 3,\ 3)$



$(\mathrm{R,G,B}) = (1,\ 1,\ 1)$