02501 IMAGE ANALYSIS, VISION & COMPUTER GRAPHICS IMM.DTU

Exercise 02501-22	**Exam – Mandatory exercise 02501-22**
Reading	ANG: Chapter 4, 5, 6, 7, 8, 9, and 10. PRIM: Chapter 2, 3.1-4, 5, 6, 8
Purpose	The purpose of this exam is to give an overview of the most fundamental concepts in computer graphics as they have been demonstrated in the exercises of the course, particularly using the API OpenGL, and the auxiliary libraries GLU and GLUT.
Background	Run the demonstration program 02501-22-00.cpp which draws an open line with the points P1=(0,0,0), P2=(0,0,5), P3=(5,0,10), P4=(10,0,5), and P5=(10,0,0). It also draws the coordinate axes Xw, Yw, and Zw as red, green, and blue line segments. Furthermore, the program draws a house with the open line as a kind of profile. Make a copy of this program for the solution of each of the following parts and name the program 02501-22-0y-xxxxxxx.cpp (where y is the part number and xxxxxxx is your student id).
Part 1	Change the house so that it is twice as long, still has the XY-plane as base, and one of the diagonals of the base from D1=(2,4,0) to D2=(22,14,0). In this way, the original point P1 has been moved to D1. Change the openGL demonstration program so as to illustrate the effect of these changes. The axes and the profile have not changed. Set up the matrices that carry out the changes. Also find the concatenated matrix. Insert the matrices as indicated in the comments of the program.
Part 2	Use a copy of the original program 02501-22-00.cpp to make an isometric view of the house. Insert the projection matrix in the program comments, where it is indicated.
Part 3	Use a copy of the demonstration program 02501-22-00.cpp and turn on lighting using the Phong equation with the standard setting of the parameters but with the exception to set the diffuse and the specular color of the material to (.8, 0., 0., 1.), and the shininess to 20. The position of the light source is (12., 10., 10.). The axes and the control polygon are not illuminated.
Part 4 (optional)	Use the points P1-P5 as control point in defining curves based on the Bezier case and the non-uniform B-spline. The degree of the curves should be 2.
Part 5 (optional)	Define the polygon P1-P5 and texture map it with the checkerboard pattern that was defined in the program 02501-20-00.cpp (available from the homepage).
Delivery	You deliver the three source codes for part 1, 2, and 3 including the answers to questions as indicated in the comments at the top of the program. State your full name and student id. at the top most part of the comments.
NB!	Part 4 and 5 are optional and do not effect the grade. However, you may choose to replace a part 1, 2, or 3 with a part 4 or 5 and in this way still deliver three parts. The tutors must check your answers/pictures on the screen. Put the delivery in an envelope (with your student id. and full name) and hand over the envelope to one of the tutors.