Course code & title	: Topics for Computer Graphics :
Session	Semester B 2020/21 Quiz 1
Time allowed	: 65 minutes

Copy the following on the first page of your test answer sheet.

"I pledge that the answers in this examination are my own and that I will not seek or obtain an unfair advantage in producing these answers. Specifically,

1. I will not plagiarize (copy without citation) from any source;
2. I will not communicate or attempt to communicate with any other person during the examination; neither will I give or attempt to give assistance to another student taking the examination; and

3. I will use only approved devices (e.g., calculators) and/or approved device models.
4. I understand that any act of academic dishonesty can lead to disciplinary action."

Name _____ SID _____ Signature _____

Qn 1 (25 marks)

a) The general equation of hyperboloid of revolution of one sheet is

$$\frac{X^2}{2^2} + \frac{Y^2}{2^2} - \frac{Z^2}{4^2} = 1$$

Use the identity $sec^2\alpha - tan^2\alpha = 1$, convert to parametric form. Specify the angle ranges.

b) If you were asked to create a "super"-hyperboloid of revolution of one sheet by including parameters $s_1, s_2,$ how would you do it?
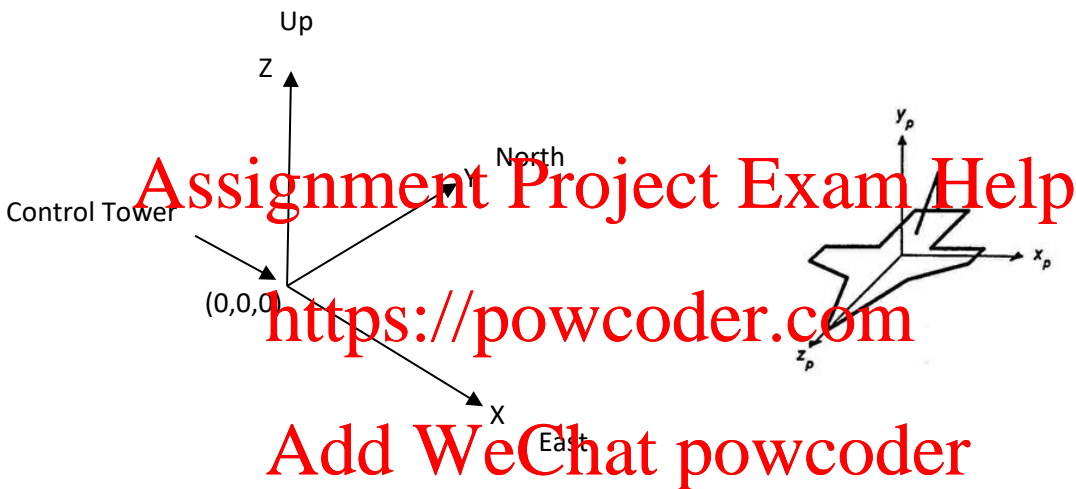
Qn 2 (25 marks)

Given

gluPerspective (60, 1, sqrt(3), 100)

Derive a set of inequalities, in camera coordinates, that can determine whether a 3D point is inside the clipping volume.

Qn 3 (25 marks)

The coordinate systems of the control tower and an airplane are shown below:

Suppose the plane is banking to the right 30^0, facing North West at a declination of 10°, and at position $(10, 10, 10)$.

Using *glRotate* and *glTranslate*, express the transformation **from control tower to the plane** using OpenGL commands.

Qn 4 (25 marks)

gluLookAt(0,30,30, 0,0,0, 0,1,0)

What are the world coordinates for a point $(0, 1, -1)$ expressed in camera coordinates?

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