1 Projective Transformation of Points (10 Points)

Let $P = (1, 0, -3)$ and $Q = (2, 3, 2)$. Suppose the projection matrix has been modified with

```c
glLoadIdentity();
gluPerspective(90.0, 1.0, 1.0, 100.0);
```

and that the modelview matrix is unchanged from its default setting. To which points (in normalized device coordinates) are $P$ and $Q$ transformed? Show your work by first indicating the frustum produced by the `gluPerspective()` call.
2 Perspective Transformation in 2D (20 Points)

a) In class, you learned that you need to specify the mapping of 5 points in general position to uniquely describe a 3D perspective transformation. How many points are required if we restrict ourselves to 2D?

b) Derive the $3 \times 3$ homogeneous matrix that maps the asymmetric view frustum drawn below into the square with corners at $(-1, -1)^T \ldots (1, 1)^T$. 

![Asymmetric view frustum](image)
3 Scan Conversion (20 Points)

a) Derive the edge equations for scan-converting the triangle given in device/pixel coordinates below. Pay attention to the sign of the equations, so that positive values correspond to the inside of the triangle.

b) Derive the plane equation for interpolating some property $c$ across the triangle. The values at the vertices are $c_1 = 0$, $c_2 = 1$, and $c_3 = 2$, respectively. You don’t need to solve any equation systems that may arise.