1. Projection Transformation

   Let (x_c, y_c, z_c) be a point in camera coordinates and let (x_p, y_p, z_p) be its perspective projection onto the viewplane. Then

$$x_p = -x_c/z_c, \qquad y_p = -y_c/z_c, \qquad z_p = -1.$$

2. Clipping Equations

   Let v_0 and v_1 be the endpoints of a line segment in the viewplane $z = -1$. If the line segment crosses the line $x = 1$, or $x = -1$, or $y = 1$, or $y = -1$ (respectively), then we solve for t in the equation

$$(1-t)v_0 + tv_1 = (1, y_c)$$
$$(1-t)v_0 + tv_1 = (-1, y_c)$$
$$(1-t)v_0 + tv_1 = (x_c, 1)$$
$$(1-t)v_0 + tv_1 = (x_c, -1)$$

   (respectively) to find the point where the line segment should be clipped.

3. Viewport Transformation

   Let $(x_p, y_p, -1)$ be a point within the viewplane's view rectangle and let (x_{vp}, y_{vp}) be its result from the viewport transformation. Then

$$x_{vp} = 0.5 + (w/2)(x_p + 1),$$
$$y_{vp} = 0.5 + (h/2)(y_p + 1).$$

4. Viewport to Pixel Transformation

   Let (x_{vp}, y_{vp}) be a point in the renderer's viewport and let (x, y) be the equivalent pixel in the framebuffer's viewport. Then

$$x = (\texttt{int})\texttt{Math.round}(x_{vp}) - 1$$
$$y = h - (\texttt{int})\texttt{Math.round}(y_{vp})$$