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Selected Problem Set 4

1. Suppose a 3D line in the viewing coordinates of the synthetic camera, defined by point $A=(0,-10,-10)^T$ and direction vector $\vec{n}=(1,1,1)^T$. Provided that the image (near plane) is at $N=-1$, give the vanishing point of this line on the the image plane.

2. Given the position of a synthetic camera $e=(5,5,5)^T$, a gaze point $g=(0,0,0)^T$, and an up direction $\vec{p}=(0,0,1)^T$, compute matrix M_v .

3. Show that this matrix transforms the point $(5,5,5)^T$ in world coordinates into the point $(0,0,0)^T$ in camera coordinates.

4. Find the rotation matrix that rotates points around vector $\vec{v}=\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)^T$ by an angle θ .

5. Explain the reason behind keeping a measure of depth for points (pseudo depth) after performing perspective projection on them.