1. A light source is placed at \((-5, 0, 0)\) and it casts shadows onto the \(yz\)-plane \(P\) defined by \(x = 1\). The \(x = 1\) plane is parallel to the \(yz\)-plane and acts like an infinite wall. When \((x, y, z)\) is a point in \(\mathbb{R}^3\) with \(-5 < x \leq 1\), define \(A((x, y, z))\) to be the position of the shadow of the point on the plane \(P\). E.g., \(A((-2, 1, 2)) = (1, 2, 4)\), and \(A((-3, -1, -2)) = (1, -3, -6)\).

(a) Working in ordinary coordinates (not homogeneous) give the formula expressing the mapping \(A((x, y, z)) = (x', y', z')\). That is, give formulas for \(x', y', z'\) in terms of \(x, y, z\).

\[
\begin{align*}
x' &= 1 \\
y' &= \frac{y}{x+5} \\
z' &= \frac{6z}{x+5} \\
\end{align*}
\]

\(A: \langle x, y, z \rangle \mapsto \langle 1, \frac{6y}{x+5}, \frac{6z}{x+5} \rangle\)

(b) Give a \(4 \times 4\)-matrix that represents the transformation \(A\) over homogeneous coordinates.

In homogeneous coordinates,
\[
\langle x, y, z, 1 \rangle \mapsto \langle x+5, 6y, 6z, x+5 \rangle
\]

\(4 \times 4\) Matrix: 
\[
\begin{pmatrix}
1 & 0 & 0 & 5 \\
0 & 6 & 0 & 0 \\
0 & 0 & 6 & 0 \\
1 & 0 & 0 & 5
\end{pmatrix}
\]