Computer Graphics - Excercise 1

1.1.1

a)

- Matrix Multiplication $\equiv$ transformation
- Inverse of a transformation $\tilde{T}^{-1}$

$$
\begin{aligned}
\Rightarrow \qquad & \tilde{T} * \tilde{T}^{-1} = \tilde{T}^{-1} * \tilde{T} = \tilde{E} && \mid *\tilde{p} \\
& \tilde{T}^{-1} * \tilde{T} * \tilde{p} = \tilde{E} * \tilde{p} && \mid \tilde{T} * \tilde{p} = \tilde{p'} \\
\Rightarrow \qquad & \tilde{E} * \tilde{p} = \tilde{p}, \quad \tilde{T}^{-1} * \tilde{p'} = \tilde{p}
\end{aligned}
$$

b)

1.1.2

a)

$$
\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} * \begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ y_1 & y_2 & \cdots & y_n \\ z_1 & z_2 & \cdots & z_n \end{pmatrix} = \begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ z_1 & z_2 & \cdots & z_n \\ y_1 & y_2 & \cdots & y_n \end{pmatrix}
$$

b)

$$
\begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ y_1 & y_2 & \cdots & y_n \\ z_1 & z_2 & \cdots & z_n \end{pmatrix} * \begin{pmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{pmatrix} = \begin{pmatrix} \sum_{i=1} x \\ \sum_{i=1} y \\ \sum_{i=1} z \end{pmatrix}
$$

c)

$$
\begin{aligned}
L(p) &= length(p_x - ((p_x \cdot (\vec{e} + \vec{d} * t)) * \vec{d} * t) - \vec{e}) \\
Vector &= (L(p_x), L(p_{x+1}), ..., L(p_{x+n})) \qquad\qquad n \equiv Anz.Punkte
\end{aligned}
$$

Berechnung: