Solution - Exercise [3]

Introduction to Computer Graphics - B-IT Master Course

[Melisa Cecilia] [Duy Khanh Gian] [Chenyu Zhao]

November 24, 2015

Exercise 1

(a) Given are two points P_1 , $P_2 \in \mathrm{P}(R^3)$, represented by

$$h1 = (14, 3, 4, 2)^T, h2 = (12, 0, 3, 3)^T \in R^4$$

Give the projection of P_1 and P_2 into R^3.

$$h1 = (14, 3, 4, 2)^T, w = 2, h_1/w, wehaveh_1(7, \frac{3}{2}, 2)^T$$
$$h2 = (12, 0, 3, 3)^T, w = 3, h_1/w, wehaveh_1(4, 0, 1)^T$$

(b) For which point in $\mathrm{P}(R^4)$ is this projection not possible? How can these points be interpreted?

We cannot divide by 0 so its not possible with w = 0

$$h = \{(x, y, z, w)^{\mathrm{T}} | w = 0\}$$

Exercise 2

Let $\mathbf{P} : \mathbb{P}(\mathbb{R}^2) \rightarrow \mathbb{P}(\mathbb{R}^2)$ be a perspective projection along the negative †-axis onto the §-axis with eye point $\mathbb{R}^3 \in \mathbf{A} = (0,-y_0)^{\mathrm{T}}$. This projection can be seperated into a perspective transformation followed by a parallel projection along the negative †-axis. Write down the matrices for the perspective projection, the corresponding perspective transformation and the subsequent parallel projection

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & \frac{1}{y_0} & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} . \begin{pmatrix} 1 & ? & ? \\ 0 & 1 & 0 \\ 0 & \frac{1}{y_0} & 1 \end{pmatrix}$$