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EXERCISE 3
DUE 30.11.2015, 12:15 PM

Question 1 (5 Points)

Transformations.
Give the transformation matrix T that rotates a point around another point $R = (1, 2, 3)$ by $35°$ around the z-axis and *afterwards* scales it by a factor of 2 with the center of scaling at point $S = (2, 2, 2)$.
It is sufficient to give the translation, rotation and scale matrices and the correct concatination of them. For example, for translating a point by $(1, 1, 1)$ and then rotating it by $45°$ around the y-axis, this would look like this:

$$M_t = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}, M_r = \begin{pmatrix} cos(45°) & 0 & sin(45°) & 0 \\ 0 & 1 & 0 & 0 \\ -sin(45°) & 0 & cos(45°) & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}, T = M_t \cdot M_r$$

Question 2 (5 Points)

Give 5 reasons why the visual perception of the real world is different from the one in a virtual reality under consideration of the currently available hardware and software!

Question 3 (4 Points)

We want to draw four rectangles into a window sized 4×4 pixels using z-buffering. The rectangles are defined as follows (higher z-value means closer to the viewer):

1. $(0, 1, 1), (2, 1, 1), (2, 3, 1), (0, 3, 1)$
2. $(2, 0, 2), (3, 0, 2), (3, 1, 2), (2, 1, 2)$
3. $(1, 1, 3), (3, 1, 1), (3, 2, 1), (1, 2, 3)$
4. $(0, 2, 0), (1, 2, 0), (1, 3, 0), (0, 3, 0)$

Draw the rectangles in the given order and thereby simulate the z-buffer method. Give the content of the z-buffer for each step.

Please turn in your solution via L^2P or by handing it in at the beginning of the exercise lesson.