COSC342:
Computer Graphics
2017

Tutorial
TRANSFORMATIONS IN 3D
Stefanie Zollmann

3D COORDINATE SYSTEMS

- What is the difference between a left- and a right handed coordinate system?

- Where are left-handed coordinate system used? Where are right-handed used?

TRANSFORMATIONS: SCALE
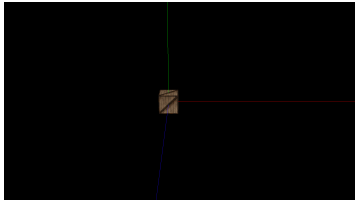
- Describe scale in 3D:

TRANSFORMATIONS: TRANSLATION

- Describe translation in 3D:

TRANSFORMATIONS: TRANSLATION

- With the following starting 3D scene what would be the difference of applying $M = S_1 T_1$ or $M = T_1 S_1$?

$$S_1 = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T_1 = \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

TRANSFORMATIONS: ROTATION

- Describe rotation around the z axis in 3D:
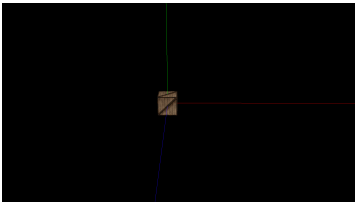
TRANSFORMATIONS: ROTATION

- Describe rotation around the y axis in 3D:

TRANSFORMATIONS: ROTATION

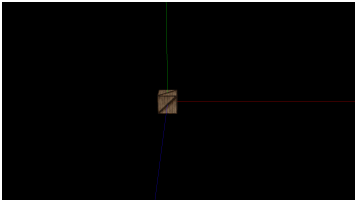- Describe rotation around the x axis in 3D:

TRANSFORMATIONS: ROTATION

- What is the result of applying rotation matrix R1 to the following scene?

$$R_1 = \begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

TRANSFORMATIONS: ROTATION

- What is the result of applying rotation matrix M= R_1T_1 to the following scene?

$$R_1 = \begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T_1 = \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

COLUMN-MAJOR VS ROW-MAJOR ORDER

- What is the difference between column major and row-major order matrices?

Thank You!

For more material visit
http://www.cs.otago.ac.nz/cosc342/