

Einführung

Lösungen zu den Vorlesungsübungen

Exercise: Vectors

- velocity = distance / time: $v = s / t$, therefore: $s = v * t$
- $s(0) = (0,0)$
- $s(1) = s(0) + v(0)*1 = (0, 0) + (1, 0) = (1, 0)$
- $s(2) = s(1) + v(1)*1 = (1, 0) + (0.5, 0.25) = (1.5, 0.25)$
- $s(3) = s(2) + v(2)*1 = (1.5, 0.25) + (0, 0.5) = (1.5, 0.75)$

Exercise: Screen space square

- $\text{aspect} = w/h$
- $b = a / \text{aspect} = b * h / w$

Exercise: Normal

$$a = \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix} \quad b = \begin{pmatrix} 5 \\ 2 \\ 1 \end{pmatrix} \quad c = \begin{pmatrix} 3 \\ 2 \\ 4 \end{pmatrix}$$

$$v = \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix} \quad w = \begin{pmatrix} 0 \\ 0 \\ 3 \end{pmatrix}$$

$$v \times w = \begin{pmatrix} 0 \\ -6 \\ 0 \end{pmatrix}$$

$$n = \bar{n} = \frac{1}{6} \begin{pmatrix} 0 \\ -6 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix}$$

Exercise: Depth Buffer

- **(x: 23, y: 42, z: 23, color: red)**
- ~~(x: 23, y: 42, z: 42, color: green)~~ // further away
- ~~(x: 42, y: 23, z: 12, color: blue)~~ // other image pixel
- ~~(x: 23, y: 42, z: 12, color: orange)~~ // wrong side of camera

Exercise: Scene Graph

```
root = new GroupNode()
unicorn = new UnicornNode();
FOR i: 0 ... 2 DO
  FOR j: 0 ... 3 DO
    translation = new TranslationNode( $x_0 + \Delta * i$ ,  $y_0 + \Delta * j$ )
    root.add(translation)
    translation.add(unicorn)
  OD
OD
```