

#2: Geometry & Homogeneous Coordinates

CSE167: Computer Graphics

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Outline for Today

More math...

- n **Finish linear algebra: Matrix composition**
 1. Points, Vectors, and Coordinate Frames
 2. Homogeneous Coordinates

Matrix Multiplication

- Each entry is dot product of row of M with column of N

$$\mathbf{M} = \begin{bmatrix} m_{xx} & m_{xy} & m_{xz} \\ m_{yx} & m_{yy} & m_{yz} \\ m_{zx} & m_{zy} & m_{zz} \end{bmatrix} \quad \mathbf{N} = \begin{bmatrix} n_{xx} & n_{xy} & n_{xz} \\ n_{yx} & n_{yy} & n_{yz} \\ n_{zx} & n_{zy} & n_{zz} \end{bmatrix}$$

$$\mathbf{L} = \mathbf{M} \mathbf{N}$$

$$\begin{bmatrix} l_{xx} & l_{xy} & l_{xz} \\ l_{yx} & l_{yy} & l_{yz} \\ l_{zx} & l_{zy} & l_{zz} \end{bmatrix} = \begin{bmatrix} m_{xx} & m_{xy} & m_{xz} \\ m_{yx} & m_{yy} & m_{yz} \\ m_{zx} & m_{zy} & m_{zz} \end{bmatrix} \cdot \begin{bmatrix} n_{xx} & n_{xy} & n_{xz} \\ n_{yx} & n_{yy} & n_{yz} \\ n_{zx} & n_{zy} & n_{zz} \end{bmatrix}$$

$$l_{xy} = m_{xx}n_{xy} + m_{xy}n_{yy} + m_{xz}n_{zy}$$