

4x4 Matrix Multiplication

$$\begin{bmatrix} 1 & 3 & 4 & 4 \\ 6 & 1 & 2 & 1 \\ 3 & 6 & 4 & -1 \\ 6 & 9 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 4 & 5 \\ 2 & -1 & 5 & 7 \\ 3 & -2 & 4 & 5 \\ 5 & 7 & 0 & 8 \end{bmatrix}$$

$$= \begin{bmatrix} 1 \times 1 + 3 \times 2 + 4 \times 3 + 4 \times 5, & 1 \times 0 + 3 \times -1 + 4 \times -2 + 4 \times 7, & 1 \times 4 + 3 \times 5 + 4 \times 4 + 4 \times 0, & 1 \times 5 + 3 \times 7 + 4 \times 5 + 4 \times 8 \\ 6 \times 1 + 1 \times 2 + 2 \times 3 + 1 \times 5, & 6 \times 0 + 1 \times -1 + 2 \times -2 + 1 \times 7, & 6 \times 4 + 1 \times 5 + 2 \times 4 + 1 \times 0, & 6 \times 5 + 1 \times 7 + 2 \times 5 + 1 \times 8 \\ 3 \times 1 + 6 \times 2 + 4 \times 3 + -1 \times 5, & 3 \times 0 + 6 \times -1 + 4 \times -2 + -1 \times 7, & 3 \times 4 + 6 \times 5 + 4 \times 4 + -1 \times 0, & 3 \times 5 + 6 \times 7 + 4 \times 5 + -1 \times 8 \\ 6 \times 1 + 9 \times 2 + 0 \times 3 + 1 \times 5, & 6 \times 0 + 9 \times -1 + 0 \times -2 + 1 \times 7, & 6 \times 4 + 9 \times 5 + 0 \times 4 + 1 \times 0, & 6 \times 5 + 9 \times 7 + 0 \times 5 + 1 \times 8 \end{bmatrix}$$

$$= \begin{bmatrix} 39 & 17 & 35 & 78 \\ 19 & 2 & 37 & 55 \\ 22 & -21 & 58 & 69 \\ 29 & -2 & 69 & 101 \end{bmatrix}$$

Vector Multiplikation

$$\begin{bmatrix} 1 & 3 & 4 & 4 \\ 6 & 1 & 2 & 1 \\ 3 & 6 & 4 & -1 \\ 6 & 9 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 4 \\ 5 \end{bmatrix}$$

$$= \begin{bmatrix} 1 \times 1 + 3 \times 0 + 4 \times 4 + 4 \times 5 \\ 6 \times 1 + 1 \times 0 + 2 \times 4 + 1 \times 5 \\ 3 \times 1 + 6 \times 0 + 4 \times 4 + -1 \times 5 \\ 6 \times 1 + 9 \times 0 + 0 \times 4 + 1 \times 5 \end{bmatrix}$$

$$= \begin{bmatrix} 37 \\ 19 \\ 14 \\ 11 \end{bmatrix}$$