

# Matrix multiplication

$$\begin{bmatrix} 3 & -1 \\ 2 & -4 \end{bmatrix} \cdot \begin{bmatrix} -2 & 3 \\ 1 & -2 \end{bmatrix} =$$
  
$$\begin{bmatrix} 3(-2) + (-1)(1) & 3(3) + (-1)(-2) \\ 2(-2) + (-4)(1) & 2(3) + (-4)(-2) \end{bmatrix}$$

The calculation shows the dot product of the first row of the first matrix with the first column of the second matrix, resulting in  $-7$ . The dot product of the first row of the first matrix with the second column of the second matrix, resulting in  $11$ . The dot product of the second row of the first matrix with the first column of the second matrix, resulting in  $-8$ . The dot product of the second row of the first matrix with the second column of the second matrix, resulting in  $14$ .

$$2a) \begin{bmatrix} 2 & 1 \\ 1 & -1 \end{bmatrix} \cdot \begin{bmatrix} 4 & 3 & 2 \\ -2 & 4 & 5 \end{bmatrix}$$

$$\begin{bmatrix} 2 \cdot 4 + 1 \cdot (-2) & 2 \cdot 3 + 1 \cdot 4 & 2 \cdot 2 + 1 \cdot 5 \\ 1 \cdot 4 + (-1) \cdot (-2) & 1 \cdot 3 + (-1) \cdot 4 & 1 \cdot 2 + (-1) \cdot 5 \end{bmatrix}$$

$\begin{matrix} \textcircled{6} & \textcircled{10} & \textcircled{9} \\ \textcircled{6} & \textcircled{-1} & \textcircled{-3} \end{matrix}$