

CH159b; Maths Part 2: Matrix addition, subtraction and multiplication

Problems

1: addition and subtraction

$$\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} + \begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} - \begin{pmatrix} 2 & 1 \\ -3 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} + \begin{pmatrix} 1 & -3 & 0 \\ 2 & 2 & 0 \\ 0 & 4 & 1 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} + \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} + \begin{pmatrix} 2 & 1 \\ -3 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 1 \\ 4 & 2 & 10 \end{pmatrix} + \begin{pmatrix} 2.5 & -1 & 5 \\ 3.4 & -4.2 & -2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} - \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} + \begin{pmatrix} 1 & 0 \\ 0 & 2 \\ 0 & 0 \end{pmatrix} =$$

2: multiplication by a scalar

$$2 \times \begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} =$$

$$(-3) \times \begin{pmatrix} 2 & 1 \\ -3 & 2 \end{pmatrix} =$$

$$10 \times \begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} \times 2 =$$

$$2.5 \times \begin{pmatrix} 1 & 3 & 1 \\ 4 & 2 & 10 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} \div 10 =$$

3: multiplication of matrices

$$\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} \times \begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} \times \begin{pmatrix} 2 & 1 \\ -3 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 1 \\ 4 & 2 & 10 \end{pmatrix} \times \begin{pmatrix} 2 & -1 \\ 3 & -4 \\ 1 & 0 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} \times \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} \times \begin{pmatrix} 1 & -3 & 0 \\ 2 & 2 & 0 \\ 0 & 4 & 1 \end{pmatrix} =$$

$$\begin{pmatrix} 2 & 1 \\ -3 & 2 \end{pmatrix} \times \begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} \times \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} =$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix} \times \begin{pmatrix} 1 & 0 & 1 \\ 0 & 2 & 3 \end{pmatrix} =$$

Answers

1: addition and subtraction

$$\begin{pmatrix} 2 & 6 \\ 8 & 4 \end{pmatrix}$$

$$\begin{pmatrix} -1 & 2 \\ 7 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 0 & 0 \\ 6 & 4 & 0 \\ 1 & 9 & 3 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 3 & 4 \\ 1 & 4 \end{pmatrix}$$

$$\begin{pmatrix} 3.5 & 2 & 6 \\ 7.4 & -2.2 & 8 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 3 & 0 \\ 4 & 0 & 0 \\ 1 & 5 & -1 \end{pmatrix}$$

can't!

2: multiplication by a scalar

$$\begin{pmatrix} 2 & 6 \\ 8 & 4 \end{pmatrix}$$

$$\begin{pmatrix} -6 & -3 \\ 9 & -6 \end{pmatrix}$$

$$\begin{pmatrix} 10 & 30 & 0 \\ 40 & 20 & 0 \\ 10 & 50 & 20 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 6 \\ 8 & 4 \end{pmatrix}$$

$$\begin{pmatrix} 2.5 & 7.5 & 2.5 \\ 10 & 5 & 25 \end{pmatrix}$$

$$\begin{pmatrix} 0.1 & 0.3 & 0 \\ 0.4 & 0.2 & 0 \\ 0.1 & 0.5 & 0.2 \end{pmatrix}$$

3: multiplication of matrices

$$\begin{pmatrix} 13 & 9 \\ 12 & 16 \end{pmatrix}$$

$$\begin{pmatrix} -7 & 7 \\ 2 & 8 \end{pmatrix}$$

$$\begin{pmatrix} 12 & -13 \\ 24 & -12 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 7 & 3 & 0 \\ 8 & -8 & 0 \\ 11 & 15 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 6 & 8 \\ 5 & -5 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 3 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 2 \end{pmatrix}$$

can't!