

# matrix arithmetic: addition and subtraction

Let  $A$  and  $B$  be  $m \times n$  matrices. The sum of  $A$  and  $B$ , denoted  $A + B$ , is

$$\begin{bmatrix} a_{11} + b_{11} & a_{12} + b_{12} & \cdots & a_{1n} + b_{1n} \\ a_{21} + b_{21} & a_{22} + b_{22} & \cdots & a_{2n} + b_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} + b_{m1} & a_{m2} + b_{m2} & \cdots & a_{mn} + b_{mn} \end{bmatrix}$$

## exercise 1

$$\text{Let } A = \begin{bmatrix} 2 & -1 \\ 3 & 6 \end{bmatrix}.$$

Find the matrix  $X$  such that  $2A + 3X = -4A$

# matrix arithmetic: scalar multiplication

Let  $A$  be an  $m \times n$  matrix and let  $k$  be a scalar. The scalar multiplication of  $k$  and  $A$ , denoted  $kA$ , is

$$\begin{bmatrix} ka_{11} & ka_{12} & \cdots & ka_{1n} \\ ka_{21} & ka_{22} & \cdots & ka_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ ka_{m1} & ka_{m2} & \cdots & ka_{mn} \end{bmatrix}$$

## exercise 2

$$\text{Let } A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 2 & 1 \\ 5 & 5 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 4 & 6 \\ 1 & 2 & 2 \\ -1 & 0 & 4 \end{bmatrix}$$

Simplify the following expression:  $5(A + B)$