

## Matrix multiplication

1. Let  $A = \begin{pmatrix} 1 & 3 \\ 4 & 5 \end{pmatrix}$ ,  $B = \begin{pmatrix} 1 & 1 & 1 \\ 4 & 5 & 6 \end{pmatrix}$ ,  $C = \begin{pmatrix} 1 & 4 \\ 1 & 5 \\ 1 & 6 \end{pmatrix}$ ,  $D = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$ ,  $E = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$ .

For each of the following say whether it makes sense to compute it. If it makes sense then do the computation.

(i)  $AA$  (ii)  $AB$  (iii)  $AC$  (iv)  $AE$  (v)  $DA$  (vi)  $CE$  (vii)  $A+B$  (viii)  $A+D$ .

2. Let  $A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$ . Find a column vector  $B$  such that  $AB = \begin{pmatrix} b \\ e \\ h \end{pmatrix}$  (the middle column of  $A$ ).

3. Write the following system in matrix form

$$\begin{array}{rclcl} 2x & + & 3y & + & 5z & = & 2 \\ & & & & 2y & + & z & = & 1 \\ x & - & 2y & + & & = & 3. \end{array}$$

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