

## REAL MATRIX-MATRIX PRODUCTS

## Definition

Let  $A \in \mathbf{R}^{l \times m}$  and  $B \in \mathbf{R}^{m \times n}$ . In this case we call A and B conformable. The matrix-matrix product of A and B is the matrix  $C \in \mathbf{R}^{l \times n}$  whose ith row  $c_i$  (for i = 1, ..., n) is defind  $c_i = Ab_i$  where  $b_i$  is the ith row of B.

## Notation

We denote the matrix product of A and B by AB.

## **Properties**

Future editions will contain accounts of the following basic properties.

**Proposition 1.** Matrix multiplication is associative.

**Proposition 2.** Matrix multiplication is not commutative.

Indeed, the matrix-matrix product of B and A may not even be defined, if B and A are not conformable.

